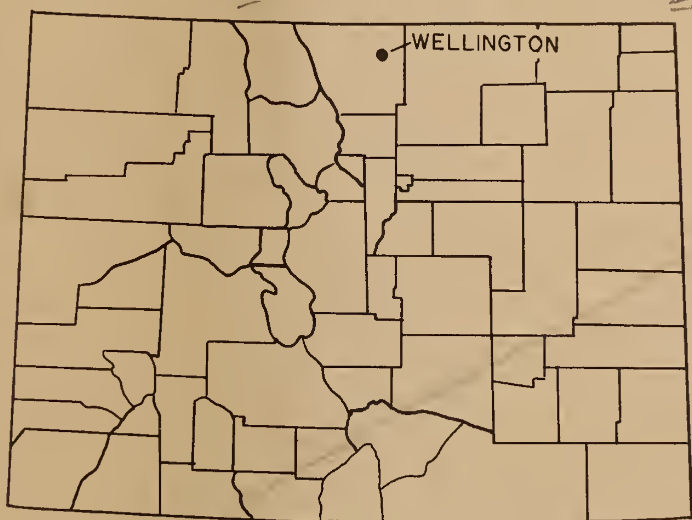
FLOOD PLAIN MANAGEMENT STUDY

BOXELDER CREEK IN THE VICINITY OF TOWN OF WELLINGTON, CO



Prepared by the

U.S. Department of Agriculture
Soil Conservation Service
Denver, Colorado

in cooperation with the

Colorado Water Conservation Board
Town of Wellington
Larimer County, Colorado

September 1983

PREFACE

This report includes information on the flood hazard areas along Boxelder Creek in the vicinity of Wellington, Colorado.

Because of potential flood damages, detailed flood hazard studies have been recognized as an essential item in guiding the use of flood plains. The purpose of this report is to provide adequate mapping and data for implementing flood plain management programs.

Included in the report are information on past floods, flood potential, maps, profiles, cross sections, discharge data, and recommendations for reducing potential flood damages in the Town of Wellington.

The Soil Conservation Service conducted the technical studies and prepared the report. These services were carried out in accordance with the Plan of Work of March 1982.

The assistance and cooperation provided by the Colorado Water Conservation Board, Town of Wellington and Larimer County are appreciated and gratefully acknowledged. Financial assistance provided by the Board, the Town and County included funds for photogrammetric maps, and cross section data.

The survey, hydrologic, hydraulic, and other pertinent data and computations are on file with the U.S. Department of Agriculture, Soil Conservation Service, 2490 West 26th Avenue, Denver, Colorado 80217, telephone (303) 837-5653. Additional copies of this report may be obtained from the Colorado Water Conservation Board, the Town of Wellington, Larimer County, or the Soil Conservation Service.

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INTRODUCTION

This flood plain management report was prepared by the U.S. Department of Agriculture, Soil Conservation Service, in cooperation with the Colorado Water Conservation Board, Town of Wellington and Larimer County. Interpretations of the flood plain management study and recommendations to reduce damages are included; however, it is beyond the scope of this report to provide specific proposals or plans to rectify the flooding problems.

Objectives

The objective of this study is to provide flood plain management information and mapping to the Town of Wellington and Larimer County for use in implementing flood plain management programs which will minimize potential flood losses. Included in the report are engineering and hydrologic data which will facilitate the development of a flood plain management plan, road and bridge plans and design, and non-structural and/or structural flood control measures (if needed).

Authority

This study was requested by the Town of Wellington and Larimer County through the Colorado Water Conservation Board (CWCB). The CWCB is the state coordinator for all flood plain information studies and is responsible for setting priorities and scheduling these studies. The CWCB and the Soil Conservation Service entered into a Joint Coordination Agreement for flood hazard analyses in January 1972 (revised November 1978). The Plan of Work for the Study was prepared in March, 1982.

Section 37-60-106(1)(c), Colorado Revised Statutes 1973, authorizes the Colorado Water Conservation Board "to designate and approve storm or floodwater runoff channels or basins, and to make such designations available to legislative bodies of cities and incorporated towns, to county planning commissions, and to boards of adjustment of cities, incorporated towns, and counties of this state." The Board provides assistance to local governments in development and adoption of effective floodplain ordinances. In addition, the Board will provide technical assistance to local entities during the performance of floodplain information studies within Colorado. Presently, financial assistance for the performance of floodplain studies is no longer available from the board.

Section 30-28-111 for county governments and Section 31-23-201 for municipal governments of the Colorado Revised Statutes 1973, states: The cities, incorporated towns, and counties within the study area may provide zoning regulations: "...to establish, regulate, restrict, and limit such uses on or along any storm or floodwater runoff channel or basin that has been designated and approved by the Colorado Water Conservation Board, in order to lessen or avoid the hazards to persons and damage to property resulting from the accumulation of storm or floodwaters..."

Therefore, upon official approval of this report by the Colorado Water Conservation Board, the areas described as being inundated by the 100-year flood (Intermediate Regional Flood)[1] can be designated as flood hazard areas and their use regulated accordingly by the local agencies.

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[1]The terms "Intermediate Regional Flood," "100-year flood," and "one percent flood" can be used interchangeably as they are all defined by the same type of flood event (see Glossary).

Flood plain management studies are carried out by the Soil Conservation Service as an outgrowth of the recommendations in A Report by the Task Force on Federal Flood Control Policy, House Document No. 465 (89th Congress, August 10, 1966), especially Recommendation 9(c), Regulation of Land Use, which recommended the preparation of preliminary reports for guidance in those areas where assistance is needed before a full flood plain information report can be prepared or where a full report is not scheduled.

Authority for funding flood plain management studies is provided by Section 6 of Public Law 83-566, which authorizes the U.S. Department of Agriculture to cooperate with other federal, state and local agencies to make investigations and surveys of the watersheds and rivers and other waterways as a basis for the development of coordinated programs.

In carrying out flood plain management studies, the Soil Conservation Service is being responsive to Executive Order 11988, entitled "Flood Plain Management", and Executive Order 11990, entitled "Protection of Wetlands" (both effective May 24, 1977).

DESCRIPTION OF THE STUDY AREA

Drainage Basin

The Boxelder Creek Watershed covers an area of 251 square miles in parts of Larimer and Weld Counties, Colorado and Albany and Larimer Counties, Wyoming. The watershed is about 32 miles in length and averages about 8 miles in width. Boxelder Creek is joined by Sand Creek, Rawhide Creek, Coal Creek, and Indian Creek before it flows into the Cache la Poudre River about 3 miles southeast of Fort Collins.

The study area lies within the Colorado piedmont section of the Great Plains physiographic province. Elevations range from 7,720 feet at the upper end of the basin to 5,000 feet at the lower study limit. The basin physiography consists of broadly rolling plateaus with hogback ridges and narrow mesas interspersed with narrow valleys and canyons.

Climate

The climate is considered semi-arid with normal annual precipitation totaling about 14 inches. About 9 inches of the normal annual precipitation occurs during May through September.

Precipitation is usually generated from cold fronts from the Northwest associated with moisture pushed into the area from the Gulf of Mexico by low pressure systems. Local thunder storms produce some additional summer precipitation.

Temperature data from Fort Collins shows a mean annual temperature of 48 degrees. The average frost-free season is 144 days from May 8 to September 29.

Land Use and Soils

Soils in the basin are variable. The northwest portion of the basin includes shallow to moderately deep soils developed on granites. The Western area includes soils associated with sandstone, shale, and limestone bedrock. Moderately deep gravelly soils on small plateau or mesa areas make up most of the northeast portion of the basin. Soils of the irrigated land are predominately deep or moderately deep loams over shales, sandstone or gravels. The larger drainages are predominately alluvial soils of loam to clay loam in texture.

About 67 percent of the basin is forest and range land. The natural cover on the rangelands consist of mixed grassland and shrub plant communities. Ponderosa pine and Juniper trees make up the forested areas. Cropland and hayland make up 27 percent of the basin and the remaining 6 percent is dedicated wildlife and miscellaneous areas.

The Town of Wellington and the communities of Buckeye and Waverly are within the basin.

Study Limits

The lower study limit is about 4.5 miles above the confluence of Boxelder Creek with the Cache la Poudre River and extends upstream along Boxelder Creek to a point 1/2 miles north of Wellington, Colorado. The Coal Creek flood plain, from its confluence with Boxelder Creek (1.0 mile south of Wellington) to a point 1/2 miles north of Wellington, is also included in this study. Both Boxelder Creek and Coal Creek flow through the Town of Wellington. These are the only stream reaches within the study area that involve an urban community.

The total length of flood plain included in this study is 9.43 miles along Boxelder Creek and 2.50 miles along Coal Creek.

Study Reaches

The study area map was divided into stream reaches because of significant differences in flood plain topography, hydraulic characteristics, and magnitude of discharges.

The enclosed study area map (index map) shows the location of each reach. Reach distances are as follows:

Reach Number	Length-Miles
1 - Boxelder Creek	4.89
2 - Boxelder Creek	1.67
3 - Boxelder Creek	1.03
4 - Boxelder Creek	0.56
5 - Boxelder Creek	0.67
6 - Boxelder Creek	0.61
7 - Coal Creek	0.85
8 - Coal Creek	1.13
9 - Coal Creek	0.52
TOTAL	11.93 miles

The various exhibits included in this report are related to these reach designations.

Natural and Beneficial Flood Plain Values

The flood plains along Boxelder Creek are intensly cropped. Only the main channel has been left in a natural state. This narrow channel is vegetated with a variety of forbs, grasses, sedges and rushes, interspersed with cottonwoods, willows and siberian elm. The meandering channel, passing through intensely cropped farmland, provides a diversity in landscape. This diversity enhances the visual aesthetics and wildlife habitat values in the area.

Although narrow, the channel corridor provides a travelway and cover for wildlife. It is used primarily by mule deer, ringnecked pheasants, mourning doves, cottontails and some migratory waterfowl. Cropland in the flood plain supply a food source for wildlife in the area.

A small irrigation regulating reservoir is located next to Boxelder Creek approximately one-half mile below Wellington. Other small areas of open water occur in the Boxelder Creek channel. While not within the study area, there are numerous irrigation supply reservoirs throughout the general area. These reservoirs are used extensively by migratory waterfowl and resident Canada geese.

Of particular interest to wildlife and sportsmen groups is the 1,242 acre Wellington State Wildlife Area located along the Indian Creek flood plain southeast of Wellington, Colorado. This is a predominantly wet area where ground water is forced to the surface by tighter soils and shallow depths to shale. Cover and food plots have been put in for waterfowl and game birds. The Wellington Wildlife Area provides good pheasant, duck and rabbit hunting during those seasons. Sportsmen and others may be use the area at any time for hiking, hunting, bird watching or other diversions. No parking or camping is permitted within the area.

RELATED FLOOD STUDIES

Five floodwater retarding reservoirs were constructed during the period 1971 through 1981. Four are located in the basin upstream from the upper study limit, and the fifth is on Indian Creek which joins Boxelder Creek near the middle of the study area, see figure 1. The structures were built under the Watershed Protection and Flood Prevention Act (Public Law 566, 83rd Congress). A planning document "Watershed Work Plan, Boxelder Creek Watershed" is available at the Soil Conservation Service Office in Denver. The planning for this project considered flood damages for before and after project conditions. The planning detail was not considered adequate, however, for developing zoning ordinances and other regulation measures needed for managing the flood plain.

A dam breach study was made by the Soil Conservation Service in 1980. The purpose of the study was to define the flood zone of a possible failure of floodwater retarding dam B-2 (see figure 1), which is a part of the Watershed project previously discussed. The report shows the potential dam breach flood boundary from structure B-2 (about 8 miles upstream of Wellington) to the southern boundary of the Town of Wellington.

A master drainageway planning study was made by Simons, Li & Associates, Inc. in 1981. The study encompassed cooper slough and the reach of Boxelder Creek downstream from the lower study limit of this flood plain management study. Hydrologic information from the Simons & Li Report was used in this study.

FLOOD HISTORY

Flooding on Great Plains streams in Colorado is caused by summer storms. Colorado Front Range streams flood from summer rains as well as from snowmelt and occasionally from a combination of the two. The Boxelder Creek Basin is more characteristic of the Great Plains streams because of its orientation and elevation. The relatively recent "Big Thompson River Flood of 1976" is an indication of the magnitude of rainfall (12 in.) that can occur in this part of Colorado. This was a July 31-August 1 storm.

According to the "Watershed Work Plan, Boxelder Creek Waterhshed", damaging floods occurred on Boxelder Creek on an average of once every year. Because of the recentness of reservoir construction (project completed 1981), there is no flood history of the study area for post project conditions. The reservoirs retain runoff from a combined area of 175.5 square miles or 70 percent of the drainage basin. The level of flood protection decreases, however, as the distance below the structures increases. The project work plan estimated that at Highway 14, east of Fort Collins, the pre-project 100 year flood would be reduced by the project to a 4 year frequency.

The above information however is based on uniform rainfall over the entire basin. This is generally not the way storms occur historically. Flooding from moving storm cells can occur along any portion of the basin, including the area uncontrolled by reservoirs, therefore, records of past flood events in the basin are still useful information. A discussion of recorded flooding follows.

Boxelder Creek has a long history of flooding. Floods of record occurred in 1969, 1967, 1965, 1961, 1947, 1933, 1930, 1922, 1909, and 1904. There is no official gauging station in the watershed and no known flood flows have been measured. In general, information on past floods is based on newspaper accounts and interviews with residents of the area.

The earlist known flood was in 1904. The flood of May 20 and 21, 1904, resulted from rains of "cloudburst intensity" in the foothills at about 7,000 feet elevation on the headwaters of the North Fork Cache la Poudre River and Boxelder Creek. Damage was heavy at Fort Collins and Boxelder Creek, downstream of Fort Collins, Colorado, contributed high flows. The Greeley Tribune stated:

> "The Boxelder, a small stream ordinarily only a few feet wide, was tearing down through a fertile valley filled from bluff to bluff with a sheet of water a mile wide, carrying buildings and bridges away..."

Information obtained in August 1969 from landowners in the flood plain for the years 1959 through 1969 indicate that flood damage occurs somewhere in the watershed each year. Estimated damage from these storms follows:

August 1, 1961; one 50- to 100-year frequency storm in the vicinity of Wellington, Colorado. Forty basements were flooded in addition to agricultural and non-agricultural crops and property, with damages at $76,150.

June 1963; one 25- to 50-year frequency storm over a very small area. Estimated damages, $7,200.

June 14 through 17, 1965, one 2-year, two 1-year, and one 25-year frequency storms with some overlapping of areas. Estimated damages, $96,000.

May 30 and June 4, 1967; two 25-year frequency storms overlapping over a relatively small area in the vicinity of Wellington, Colorado. Estimated damages of $46,100 with four lives lost at a county road bridge washout.

August 4, 1969; a 1-year frequency storm occurring over a small area. Damage estimated at $4,000.

Interpretation and Use of Report

A. Frequency and Discharge

The 10-, 50-, 100-, and 500-year flood events are used as the flood frequencies for this flood plain analysis. Thus the data developed in this report will be compatible not only for regulation purposes, and H.B. 1041 designation but also for Federal Insurance Administration flood insurance rate studies.

These various flood events have an average occurrence of once in the number of years as indicated. For example, the 100-year flood occurs, on the average, once in a 100 year period, and has a one percent chance of being equaled or exceeded in any given year.

The particular uses for the various flood events in addition to those stated above are as follows:

10-Year and 50-Year Flood Events

Information regarding these lower frequency floods is especially useful for future engineering studies and land use planning purposes related to minor road systems, minor channel improvements, the location of parks and recreational facilities, agricultural lands, and appurtenant structures. For structures and uses of this type on the smaller tributaries or in areas where the high risk of structural failure is economically feasible, and the hazard of life and property nonexistent, the use of the lower frequency floods may be considered.

100-Year Flood Event

The 100-Year flood event may also be used for engineering design purposes where a lower risk of failure than the 10- or 50-year flood is desired. However, the most important use of the 100-year flood event lies in flood plain management and land use planning as set forth in the state statutes. The State of Colorado considers the 100-year frequency flood as the flood event to be used in designing and protecting structures and dwellings for human occupation. Therefore, all flood plain regulations are based upon the 100-year flood.

500-Year Flood Event

The 500-year flood event is useful in making the public aware that floods larger than the 100-year flood can and do occur. Just because a person is living above the 100-year flood boundary does not mean that he is completely safe from flooding. The 500-year flood event can also be used for regulating high risk developments within the flood plain such as nuclear power plants, or the storage or manufacture of toxic or explosive materials.

B. Flood Elevation

The exhibits and tables display study results by stream reach, as shown on the index map. Flood crest elevations for the 10-, 50-, 100-, and 500-year floods as determined at each cross section may be found in the Flood Frequency-Elevation and Discharge Data table, Table 1. The Cross Section Exhibits, B-1 through B-9, show a graphical representation of the high water elevations at typical valley cross sections throughout the study reach. Water surface elevations at the cross sections were used to prepare the flood profiles, exhibits A-1 through A-9a, which show the streambed elevation in relation to high water elevations for the 10-year 50-year, 100-year, and 500-year frequency floods.

The Flood Profiles may be used in areas where controversy arises over the 100-year flood boundary shown on the Flooded Area plates. Since the Flood Profile plates give the water surface elevation at a specific point on the reference line, the high water elevations can be surveyed on the ground to alleviate any discrepancies on the base map.

C. Flooded Areas

The Flooded Area maps, plates 1 through 13, show the boundary of the 100-year and 500-year flood plains. The flood plain boundaries were plotted from the flood profiles by determining the channel stationing of flood contours at the same interval as the topographic maps. Flood contours, shown as wiggly lines, extend perpendicular to the direction of flow and intersect the ground at the edge of the flood plain.

The areas included within the flood line boundaries are about 1,246 acres for the 100-year frequency and 1,444 acres for the 500-year.

Upon official approval of this report by the Colorado Water Conservation Board, the area outlined by the 100-year flood boundary may be regulated accordingly by the local officials.

D. Floodway

Encroachments on flood plains, such as artificial fill, can reduce the areal extent of a flood plain if provisions are made for increased flood heights. As an alternative to the present flooding situation a possible floodway with encroachment dikes was analyzed in this study. This was simply a hydraulic analysis in which the flood plain was theoretically modified to contain flooding within selected encroachment boundaries. The resulting effects on flood elevations are shown in an Appendix separate from this report.

Hydrology

Hydrologic data used in this study were provided by the Colorado Water Conservation Board (CWCB) in accordance with the Plan of Work. The original source of the discharge-frequency values was the Simons, Li & Associates, Inc. study "Cooper Slough, Boxelder Creek Master Drainageway Planning Study - 1981". The data was reviewed and concurred in by the CWCB and ourselves. The methodology for developing the discharge data was the "Storm Water Management Model" (SWMM), as revised by the Missouri River Division, U.S. Army Corps of Engineers, 1973.

Hydrologic data was based on conditions that reflected final completion of the Boxelder Creek Watershed project. A general assumption in the hydrologic data is that irrigation ditches and canals that cross the basin do not intercept flood waters from the drainages they cross. The logic behind this assumption is that the ditches and canals come into the basin full from upstream runoff and therefore have no capacity to intercept additional runoff. One exception to this assumption is the Windsor Ditch which crosses the basin at the northern boundary of the Town of Wellington. A detailed hydraulic study of this ditch showed it has the capacity to intercept about 200 cfs. from Coal Creek flows. This adjustment was made in frequency-discharge data for the portion of study area along the Coal Creek flood plain between the Windsor Ditch and its confluence with Boxelder Creek.

The frequencies concerned with in this study are the 10-year, 50-year, 100-year and 500-year events. Table 1 shows discharges at specific cross section locations. The following tabulation shows values at a few selected locations given in the previously referred to Simons, Li & Associates, Inc. Study:

Summary of Peak Flows in cfs for Boxelder Creek

Channel Location	Near X-Sec.	Drainage Area (sq mi)	Recurrence Internal in Years					
			2	10	25	50	100	500
U/S of Windsor Ditch	EJ	10.84	160	470	670	850	1080	1530
U/S of Colorado & Southern Railroad	DC	12.68	160	480	690	900	1140	1640
U/S of I-25 near Wellington	CA	13.86	160	480	710	920	1170	1690
D/S of I-25 near Wellington	BI	24.46	490	900	1270	1670	2140	3100
U/S of Willox Road	E	55.94	510	1140	1860	2730	3770	5820
Indian Creek	AJ	20.35	210	430	850	1350	1930	3100
Coal Creek 1/	GH	10.60	70	230	400	600	830	1300

1/ A hydraulic study of Windsor Canal indicated it would intercept flows from Coal Creek up to 200 cfs. Therefore, these discharges have been reduced by 200 cfs. from values shown in the Simons, Li & Associates, Inc. report.

The Boxelder Creek Watershed Project floodwater retarding structures reduced the 100 year peak flow at the junction of Boxelder Creek and Coal Creek from 13,300 cfs. to 1,170 cfs. At the lower end of the study, the 100 year peak flow was reduced from 11,900 cfs. to 3,770 cfs. Peak flow on Coal Creek, though the Town of Wellington, were reduced from 3,445 cfs. to 830 cfs.

Hydraulics

The U.S. Army Engineers HEC-2 computer program was used to perform water surface profile computations. Numerous bridges and culverts exist along the channels through the study reach. Those that created significant backwater affect were handled in the HEC-2 analysis with appropriate bridge routines. A few bridges and culverts are only minor segments of the total flood plain and therefore were considered in the Mannings retardance factor rather than in separate bridge analyses.

Cross section data, and reach length information were obtained from photogrammetric maps prepared especially for this study. Hydraulic roughness coefficients ("n" values) were determined from field inspection, and documented with photographs (in technical addendum). Following are a tabulation of these roughness coefficients for various locations along the study area.

Water surface profiles, typical cross sections and maps showing the 100 year and 500 year flood lines are shown on exhibits A, B, and Flood Hazard Area Maps. Table 1 shows computed flood elevations at specific cross sections.

Hydraulic Roughness Coefficients (n-value)

Section From	Section To	Left Overbank	Right Overbank	Channel
A	AJ	.040	.050	.035
AJ	BL	.050	.050	.040
BL	CI	.050	.045	.040
CI	DJ	.045	.050	.040
DJ	EJ	.040	.050	.035
EJ	FD	.045	.045	.040
BL	GH	.050	.050	.050
GH	HB	.050	.070	.050
HB	HC	.050	.050	.050
HC	HD	.050	.070	.050
HD	HF	.050	.070	.060
HF	HJ	.050	.070	.070
HJ	HL	.050	.070	.055
HL	HN	.050	.040	.040
HN	IE	.045	.045	.045

Note: Documenting photographics can be found in the technical supplement.

Significant divided flow occurs at two locations between Interstate 25 Highway and the lower study limit. This is a situation where the main channel overflows into two or more segments of flow divided by high ground. This is quite common for short distance. When it occurs for extended distances, separate water surface profiles should be made for each segment of flow. This was done at two locations along reach one. At these locations, different flood elevations may exist in a cross section accross the total flood plain. The dual profiles are included in table 1 data as well as on the flood delineation maps and plotted profiles.

FLOOD PLAIN MANAGEMENT

Potential flood damages to existing development and possible loss of life can be alleviated or lessened through several nonstructural and structural methods.

Nonstructural methods include: flood plain regulations, land treatment, flood warning and forecasting systems, flood insurance, flood proofing, and flood fighting and emergency evacuations.

Local Regulations

The need to minimize property damage due to flooding has been recognized by planners. Subdividers and developers are required to submit proposed storm drainage plans to the planning commission for approval. In the past, drainage plans have been prepared singularly or on a plat-by-plat basis. Information contained in this report will be useful in developing a master drainage plan for the study area. This report provides the outline of flood hazard areas on large scale maps specifically for this purpose.

The city may provide zoning regulations...

> ..."to establish, regulate, restrict, and limit such uses on or along any storm or floodwater runoff channel or basin, as such storm or floodwater runoff channel or basin has been designated and approved by the Colorado Water Conservation Board, in order to lessen or avoid the hazards to persons and damage to property resulting from the accumulation of storm or floodwaters"...

as stated in Section 30-28-111 for county governments and Section 31-23-201 for municipal governments of the Colorado Revised Statutes 1973.

Colorado Natural Hazard Area Regulations

In 1974, the Colorado General Assembly passed House Bill 1041, a bill "concerning land use, and providing for identification, designation, and administration of areas and activities of State interest, ..." (H.B. 1041, Title 24, Article 65.1, CRS 1973, as amended). Areas of State interest include natural hazard areas, or those areas that are "so adverse to past,

current, or forseeable construction or land use as to constitute a significant hazard to public health and safety or to property." Flood plains are natural hazard areas.

With reference to the administration of natural hazard areas, section 24-65.1-202(2)(a) of the Act provides: Flood plains shall be administered so as to minimize significant hazard to public health and safety or to property; open space activities shall be encouraged; structures shall be designed in terms of use and hazards; disposal sites and systems shall be protected from inundation by floodwaters; and activities shall be discouraged which, in time of flooding, would create significant hazards to public health and safety or to property.

The Act further provides that after promulgation of guidelines for land use in natural hazard areas ..., the natural hazard areas shall be administered by local government in a manner which is consistent with the guidelines for land use in each of the natural hazard areas.

Colorado Water Conservation Board Designations

Concerning the designations of flood plain, the Colorado Water Conservation Board is charged with the primary responsibility for:

1. Making recommendations to local governments and the Colorado Land Use Commission.
2. Providing technical assistance to local governments.

The Board's power and duty is ...

> ..."to devise and formulate methods, means and plans for bringing about the greater utilization of the waters of the state and prevention of flood damages therefrom, and to designate and approve storm or floodwater runoff channels or basins, and to make such designations available to legislative bodies of cities and incorporated towns, to county planning commissions, and to boards of adjustment of cities, incorporated towns, and counties of this state"...

as stated in Section 37-60-106 (1) (c) of the Colorado Revised Statutes 1973.

Upon review and approval of this report, the Colorado Water Conservation Board will designate and approve as flood plain areas those areas inundated by the 100-year flood as described by the floodwater surface elevations and profiles in this report. The use of the designated flood plain areas may then be regulated by the local government.

Model Regulations

In the model flood plain regulations, adopted by the Colorado Water Conservation Board, the statement of purpose is to promote the public health, safety, and general welfare, and minimize flood hazards and losses by provisions designed to:

1. Promote sound planning and land use, and permit only such uses within flood plains that will endanger life, health, and public safety or property in times of flooding.
2. Protect the public from avoidable financial expenditures for flood control projects, flood relief measures, and the repair and restoration of damaged public facilities.
3. Prevent avoidable interruption of business and commerce;
4. Minimize victimization of unwary home and land purchasers; and
5. Facilitate the administration of flood hazard areas by establishing requirements that must be met before use or development is permitted.

The Board's model flood plain regulations offer two options for management of the 100-year flood plain. These are the Hazard Area Concept and the Floodway Concept.

The Hazard Area concept defines the area of the flood plain in which waters of the 100-year flood attain a maximum depth greater than one and one-half feet as a high hazard area, and a depth less than this as a low hazard area.

The Board recommends that no basements should be allowed for structures located within the low hazard area and all habitable living quarters (first floors) should be constructed a minimum of one foot above the 100-year flood water surface elevations. Development is prohibited in high hazard areas.

The Floodway concept defines the channel of a stream and adjacent flood plain areas that must be kept free of development in order to safely pass the 100-year flood.

There are several methods used in floodway computations. One such theoretical method is computed on the basis of equal conveyance reduction for each side of the flood plain. Although a detailed rate study could not be made for the area included in this report, a theoretical floodway was computed for future reference. Because of the large amount of computational data, floodway information is included in Appendix II separate to this report. Data are in tabular form and include floodway widths, cross sectional flow area, and average velocities. Computations are for an increase in rise of water surface elevations in 0.5' increments from 0.0' to 1.5' above the 100-year flood.

<u>Flood Insurance</u>

The National Flood Insurance Act of 1968 (Title XIII of the Housing and Urban Development Act, P.L. 90-448) recognized the necessity for flood plain management. This Act makes federally subsidized insurance available to citizens in communities that adopt regulations controlling future developments of their flood plain. In respect to encroachment on the flood plain, the regulations require:

New residential construction or substantial improvement of existing homes must have the lowest floor level above the elevation of the 100-year flood.

Non-residential construction must meet the same standard or be flood proofed to that level.

The 1968 Act benefits owners of structures already in the flood-prone areas by providing insurance that had been unavailable through private companies. The Act created a cooperative program of insurance against flood damage by the private flood insurance industry and the federal government.

Flood insurance through the National Flood Insurance Program is available to residents of Wellington under the regular program.

The present insurance coverage is based on maps dated February 15, 1979. The amount of coverage available and the premieum rate varies considerably depending on the property location within the flood plain and the property value. All property owners shown in this study to be within areas subject to flooding should consider the purchase of flood insurance.

Additional information on the Flood Insurance Program is available from local insurance agents or brokers and the:

Federal Emergency Management Agency
Division of Insurance and Mitigation
Building 710
Denver Federal Center
Denver, Colorado 80225

Telephone 234-6582

The National Flood Insurance Program uses the floodway concept in its' rate studies for communities participating in its' regular programs.

Structural Flood Control Measures

The Boxelder Creek Watershed project, completed in 1981, is located within the Boxelder Creek Watershed. Figure 1 is a map of the watershed showing the location of floodwater retarding reservoirs. This project will undoubtedly reduce flood damages along Boxelder Creek in future years. Some remaining flood damages are likely, however, because of significant uncontrolled portions of drainages below the structure.

Flood Warning and Flood Forecasting Systems

The National Oceanic and Atmospheric Administration (NOAA) through its National Weather Service (NWS), maintains year-around surveillance of weather and flood conditions. Daily weather forecasts are issued through the NWS and disseminated by radio and television stations. A general alert to the danger of flash flooding is one of the services provided by the National Weather Service.

Evacuation Plan

An "Emergency Evacuation and Operation Plan" should provide for alerting the public of potential flooding, and coordinating community and county services during an emergency. Plan implementation during the time of an emergency requires cooperation of the general public as well as local officials. This is especially important for flood fighting, evacuation, and rescue operations. Communication is extremely important during flood alerts. Warnings issued through the National Weather Service are disseminated by radio to state and local officials.

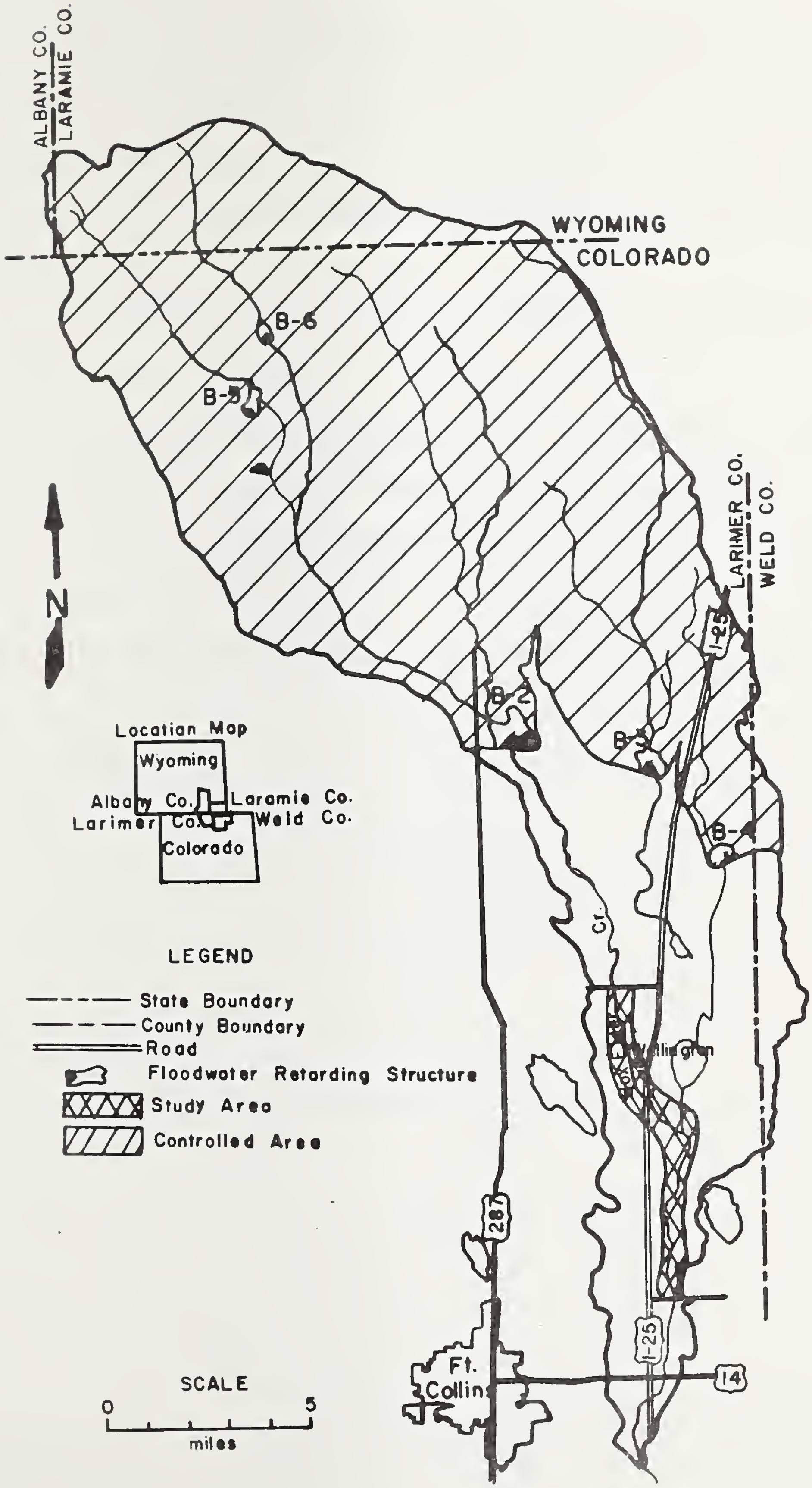

FIGURE 1. PROJECT MAP
Box Elder Creek Watershed

RECOMMENDATIONS

The following recommendations are included for consideration in reducing potential flood damages.

1. The Town of Wellington and Larimer County should implement a flood plain management plan.
2. Existing restrictions that contribute to overbank flooding should be corrected, where possible.
3. Owners and occupants of buildings and mobile homes within or adjacent to the delineated flood boundary should consider flood insurance.
4. Public information and education programs on flood hazards should be made available to the public.
5. Native vegetation along Boxelder Creek should be maintained.

GLOSSARY OF TERMS

<u>Channel</u> - A natural or artificial water course of perceptible extent with definite banks to confine and conduct continuously or periodically flowing water. Channel flow is that water which is flowing within the limits of the defined channel.

<u>Flood</u> - Water from a river, stream, water course, lake or other body of standing water, that temporarily overflows the boundaries within which it is ordinarily confined.

<u>Flood Crest</u> - The maximum stage or elevation reached by the waters of a flood at a given location.

<u>Flood Frequency</u> - A means of expressing the probability of flood occurrences as determined from a statistical analysis of representative streamflow or rainfall and runoff records. The frequency of a particular stage or discharge is usually expressed as occurring once in a specified number of years. The 10-, 25-, 50-, 100- and 500-year frequency floods have an average frequency of occurrence in the order of once in the number of years as indicated.

<u>10-Year Flood</u> - A flood having an average frequency of occurrence of once in 10 years. It has a 10 percent chance of being equaled or exceeded in any given year.

<u>100-Year Flood</u> - A flood having an average frequency of occurrence of once in 100 years. It has a 1 percent chance of being equaled or exceeded in any given year.

<u>Flood Hazard Areas</u> - Areas susceptible to flood damage.

<u>Flood Peak</u> - The highest stage or discharge attained during a flood event; also referred to as peak stage or peak discharge.

Flood Plain - The relatively flat or low land area adjoining a river, stream, watercourse, lake, or other body of standing water which has been or may be covered temporarily by flood water. For administrative purposes the flood plain may be defined as the area that would be inundated by the 100-year flood.

Perched Channel Flow - A condition where the flow elevation in the outer portions of the flood plain is higher than the flow elevation in the main channel. This condition occurs when a higher secondary channel receives inflow from some location upstream and maintains a flatter slope than the main channel.

Reach - A hydraulic engineering term used to describe longitudinal segments of a stream or river.

Runoff - That part of precipitation, as well as any other flow contributions, which appears in surface streams of either perennial or intermittent form.

Stream - Any natural channel or depression through which water flows whether continuously, intermittently, or periodically, including modification of the natural channel or depression.

Structure - Anything constructed or erected, the use of which requires a more or less permanent location on or in the ground. Includes but is not limited to bridges, buildings, canals, dams, ditches, diversions, irrigation systems, pumps, pipelines, railroads, roads, sewage disposal systems, underground conduits, water supply systems and wells.

Typical Valley Cross Section - An engineering drawing of a vertical section of a stream channel and adjoining landscape as viewed in a downstream direction. The drawing represents a specified location within a designated stream reach.

Water Surface Profile - (This term is synonymous with Flood Profile) - a graph showing the relationship of the water surface elevation of a flood event to location along a stream or river.

Watersheds - A drainage basin or area which collects runoff and transmits it usually by means of streams and tributaries to the outlet of the basin.

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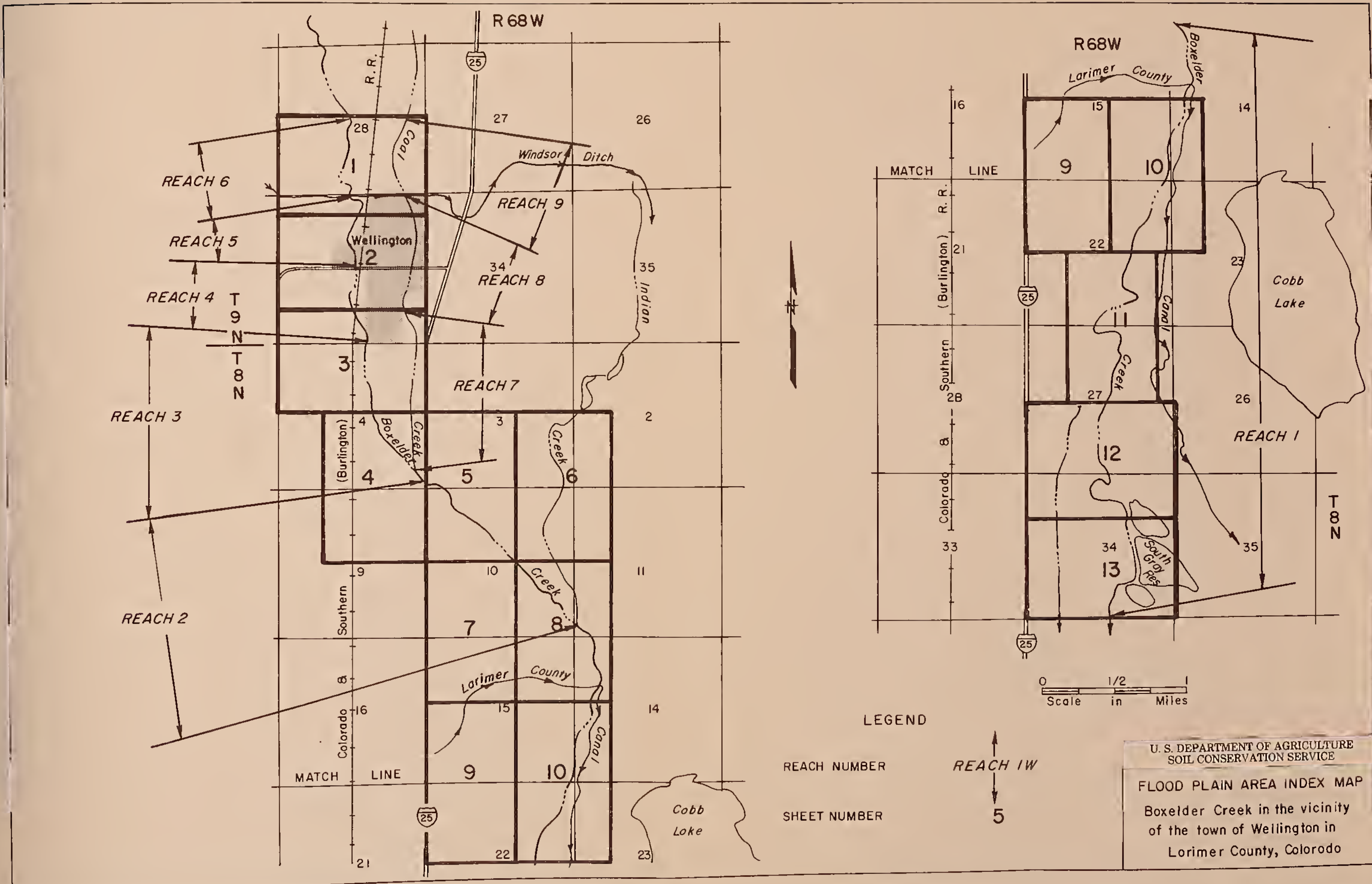

R68W
T 9 N
T 8 N
REACH 1
REACH 2
REACH 3
REACH 4
REACH 5
REACH 6
REACH 7
REACH 8
REACH 9
Wellington
Windsor Ditch
Indian
Coal
Boxelder Creek
Creek
Canal
Larimer County
Cobb Lake
South Gray Res
R.R.
(Burlington) Southern Colorado & Southern R.R.
MATCH LINE
25
0 1/2 1
Scale in Miles
LEGEND
REACH NUMBER
REACH IW
SHEET NUMBER
5
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
FLOOD PLAIN AREA INDEX MAP
Boxelder Creek in the vicinity of the town of Wellington in Lorimer County, Colorado

LEGEND

FLOOD PLAIN LIMITS

100 YEAR FLOOD
500 YEAR FLOOD

GROUND ELEVATION IN FEET MEAN SEA LEVEL DATUM — 5220
CONTOUR INTERVAL 2.0'
CROSS SECTION — A A
CROSS SECTION CONTINUED — D D
INTERMITTENT STREAM
HORIZONTAL CONTROL — 106
VERTICAL CONTROL — V46 5129.79
PHOTO CENTER
GRID POINT
100-YEAR FLOOD ELEVATION — 5132

SHEET 1-3
TOPOGRAPHY COMPILED BY PHOTOGRAMMETRIC METHODS FROM AERIAL PHOTOGRAPHY TAKEN MAY 5, 1977. GRID BASED ON COLORADO STATE PLANE COORDINATE SYSTEM, NORTH ZONE, LAMBERT CONFORMAL PROJECTION BY M&I CONSULTING ENGINEERS, FORT COLLINS, CO. BASES OF CONTROL ESTABLISHED FROM U.S. COAST & GEODETIC SURVEY AND U.S. GEOLOGICAL SURVEY CONTROL POINTS. ALL COORDINATES GIVEN ARE CALCULATED AT THE AVERAGE ELEVATION 5200' AND REDUCED TO SEA LEVEL AT AN AVERAGE LATITUDE OF 40°42'30" N. VERTICAL DATUM FROM USGS QUAD. NO. COLORADO 419, LINE NO. 3. COORDINATES: MORRIL ET- Y = 439,554.6 FT. X = 2,098,294.2 FT. LOCKLAND ET-Y = 490,564.2 FT., X = 2,123,392.9 FT.

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HORIZONTAL CONTROL IS BASED ON TRIANGULATION STATIONS ADJUSTED TO THE COLORADO STATE PLANE COORDINATE SYSTEM, NORTH ZONE, LAMBERT CONFORMAL PROJECTION. ALL COORDINATE POINTS SHOWN ON THIS MAP HAVE BEEN ADJUSTED TO LOCAL PROJECT DATUM ELEVATION OF 5160.0 FT. & AVERAGE LATITUDE OF 40°40'44". THE ADJUSTMENT FACTOR FOR THE ABOVE ELEVATION & LATITUDE ARE AS FOLLOWS:

SCALE: 0.99998471
SEA LEVEL: 0.99975324
COMBINED FACTOR: 0.99973796
RECIPRICAL FACTOR: 1.00026211

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THE FOLLOWING BENCHMARK STATIONS WERE USED:

STATION	ORDER	ELEVATION
P-356	IST.	5215.140
"DENVER 5202"	IST	5200.596

THIS MAP WAS COMPILED BY PHOTOGRAMMETRIC METHODS FROM 153 M.M. FOCAL LENGTH VERTICAL AERIAL PHOTOGRAPHY TAKEN ON MARCH 17, 1982 BY NORTHERN COLORADO PHOTOGRAMMETRICS, GREELEY, COLORADO.

SHEET 12-13
COMPILATION BY PHOTOGRAMMETRIC METHODS FROM AERIAL PHOTOGRAPHY TAKEN MAY 4, 1979 BY R&D AEROGRAPHICS, LOVELAND, CO.

THESE MAPS COMPLY WITH NATIONAL MAP ACCURACY STANDARDS

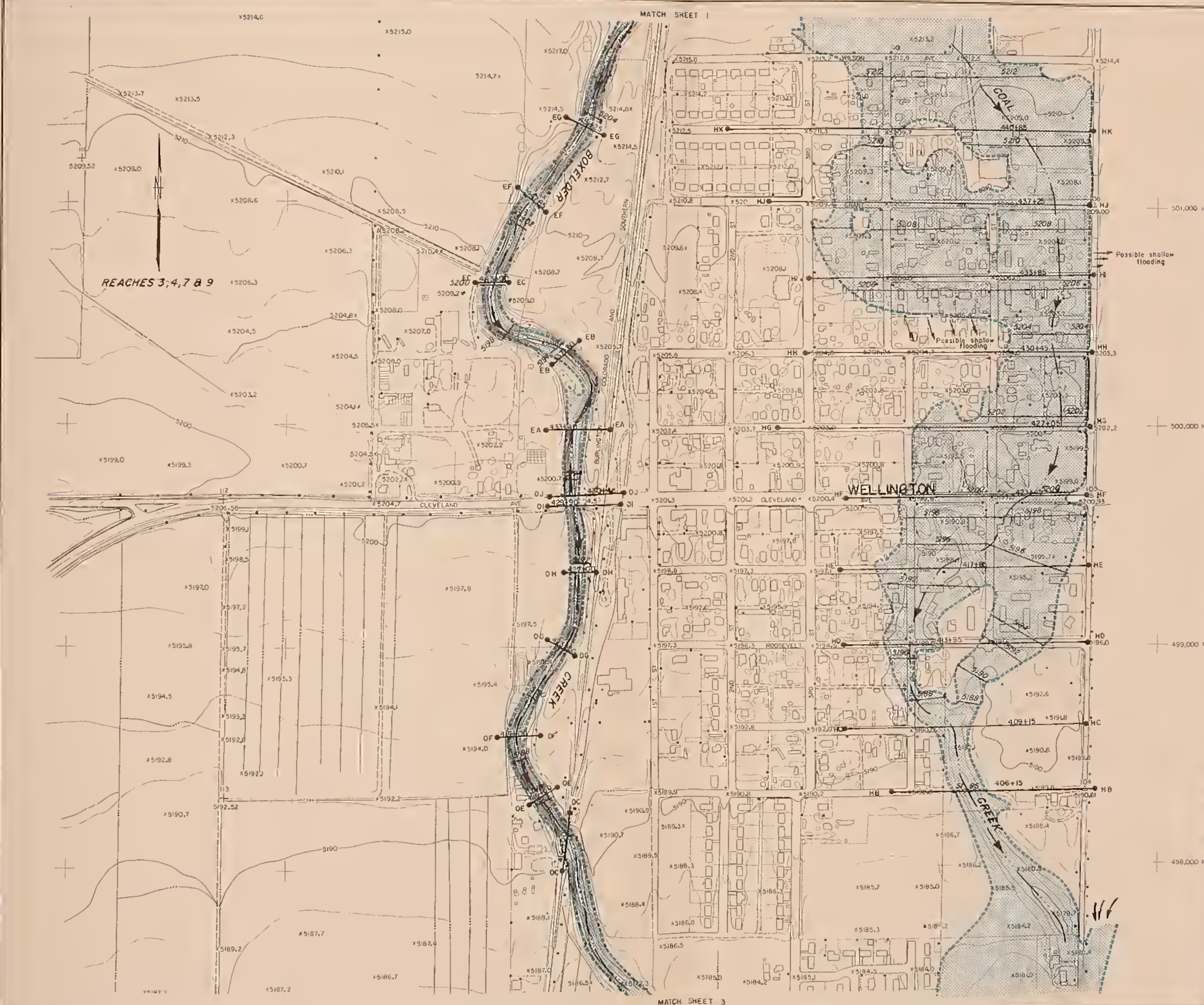
REVISION	DATE	BY

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

FLOODED AREAS
FLOOD PLAIN MANAGEMENT STUDY
BOXELDER CREEK IN THE VICINITY OF THE TOWN OF WELLINGTON IN LARIMER COUNTY, COLORADO

SCALE 200 0 200 400 600 IN FEET

SHEET 1 OF 13



LEGEND

FLOOD PLAIN LIMITS

100 YEAR FLOOD
500 YEAR FLOOD

GROUND ELEVATION IN FEET MEAN SEA LEVEL DATUM — 5220
CONTOUR INTERVAL 2.0'
CROSS SECTION — A A
CROSS SECTION CONTINUED — D D
INTERMITTENT STREAM
HORIZONTAL CONTROL — 106
VERTICAL CONTROL — V46 5129.79
PHOTO CENTER
GRID POINT
100-YEAR FLOOD ELEVATION — 5132

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U. S. DEPARTMENT OF AGRICULTURE
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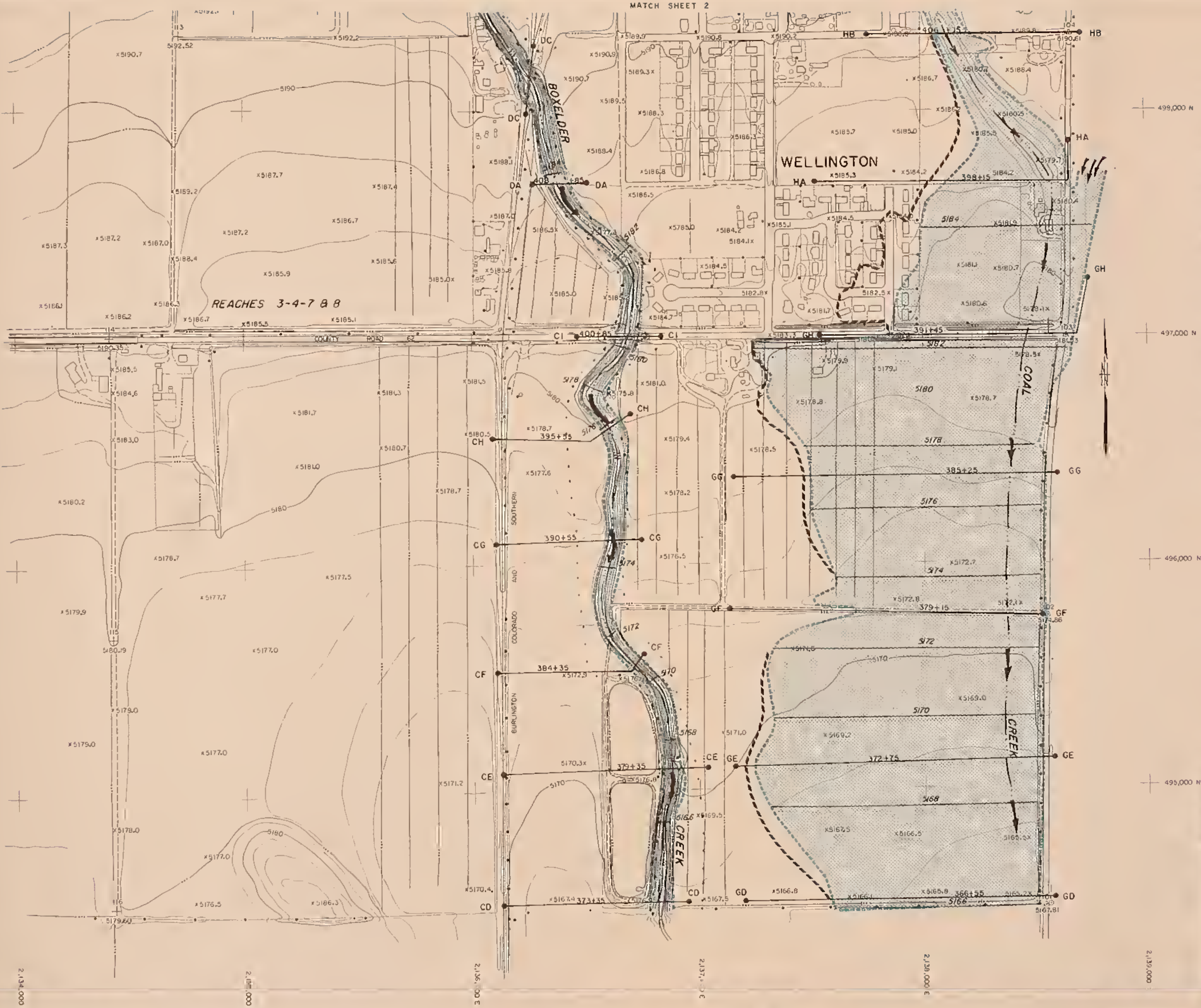
FLOODED AREAS
FLOOD PLAIN MANAGEMENT STUDY
BOXELDER CREEK IN THE VICINITY
OF THE TOWN OF WELLINGTON IN
LARIMER COUNTY, COLORADO

SCALE 200 0 200 400 600 IN FEET

SHEET 2 OF 13

MATCH SHEET 2



LEGEND

FLOOD PLAIN LIMITS

100 YEAR FLOOD
500 YEAR FLOOD

GROUND ELEVATION IN FEET MEAN SEA LEVEL DATUM — 5220
CONTOUR INTERVAL 2.0'
CROSS SECTION — A A
CROSS SECTION CONTINUED — D D
INTERMITTENT STREAM
HORIZONTAL CONTROL — 106
VERTICAL CONTROL — V46 512979
PHOTO CENTER
GRID POINT
100-YEAR FLOOD ELEVATION — 5132

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"DENVER 5202"	1ST	5200 596

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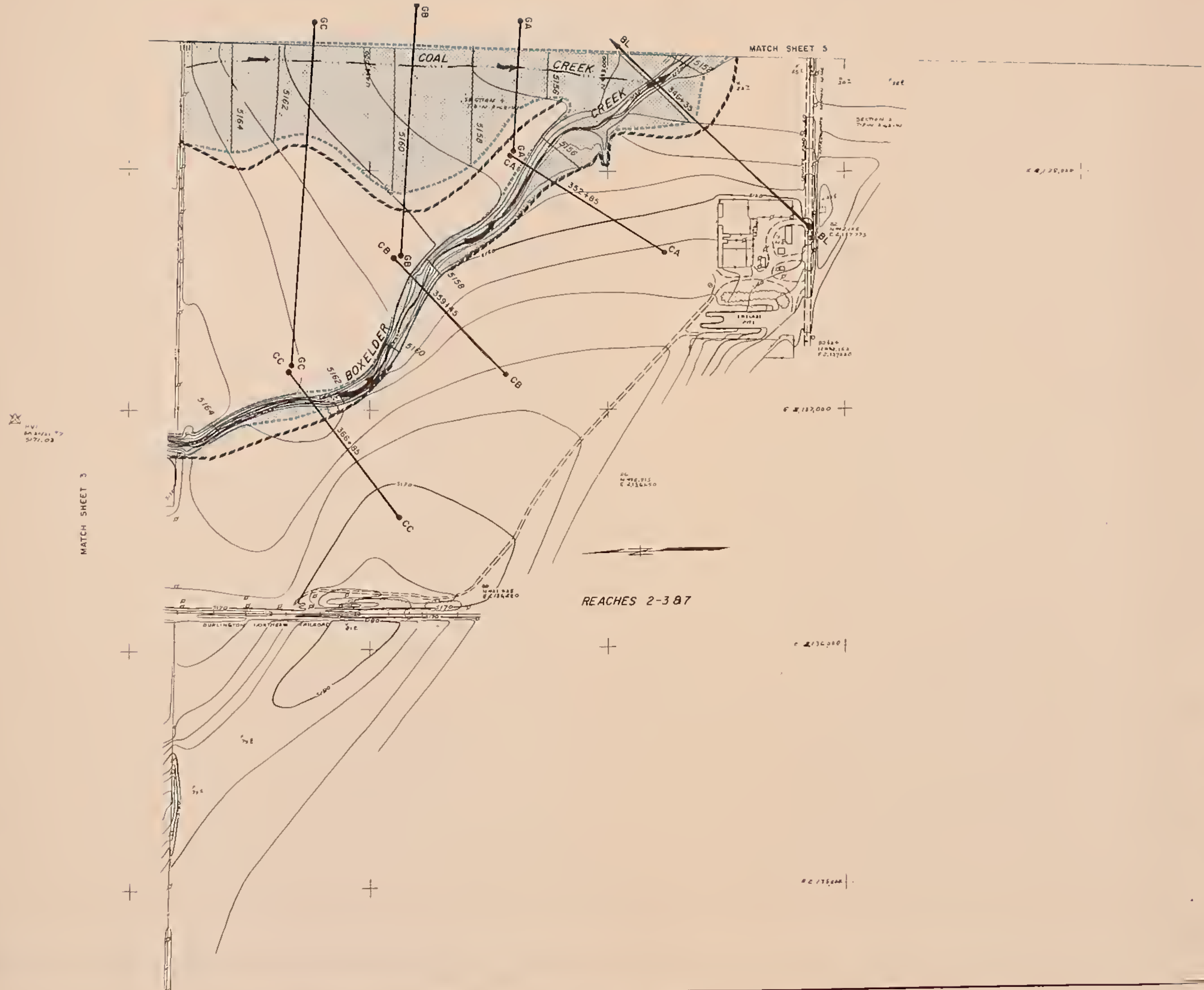
FLOODED AREAS
FLOOD PLAIN MANAGEMENT STUDY
BOXELDER CREEK IN THE VICINITY OF THE TOWN OF WELLINGTON IN LARIMER COUNTY, COLORADO

SCALE IN FEET: 200 0 200 400 600

SHEET 3 OF 13

MATCH SHEET 4



LEGEND

FLOOD PLAIN LIMITS

100 YEAR FLOOD

500 YEAR FLOOD

GROUND ELEVATION IN FEET MEAN SEA LEVEL DATUM — 5220

CONTOUR INTERVAL 2.0'

CROSS SECTION — A A

CROSS SECTION CONTINUED — D D

INTERMITTENT STREAM

HORIZONTAL CONTROL — 106

VERTICAL CONTROL — V46 5129.79

PHOTO CENTER

GRID POINT

100-YEAR FLOOD ELEVATION — 5132

SHEET 1-3

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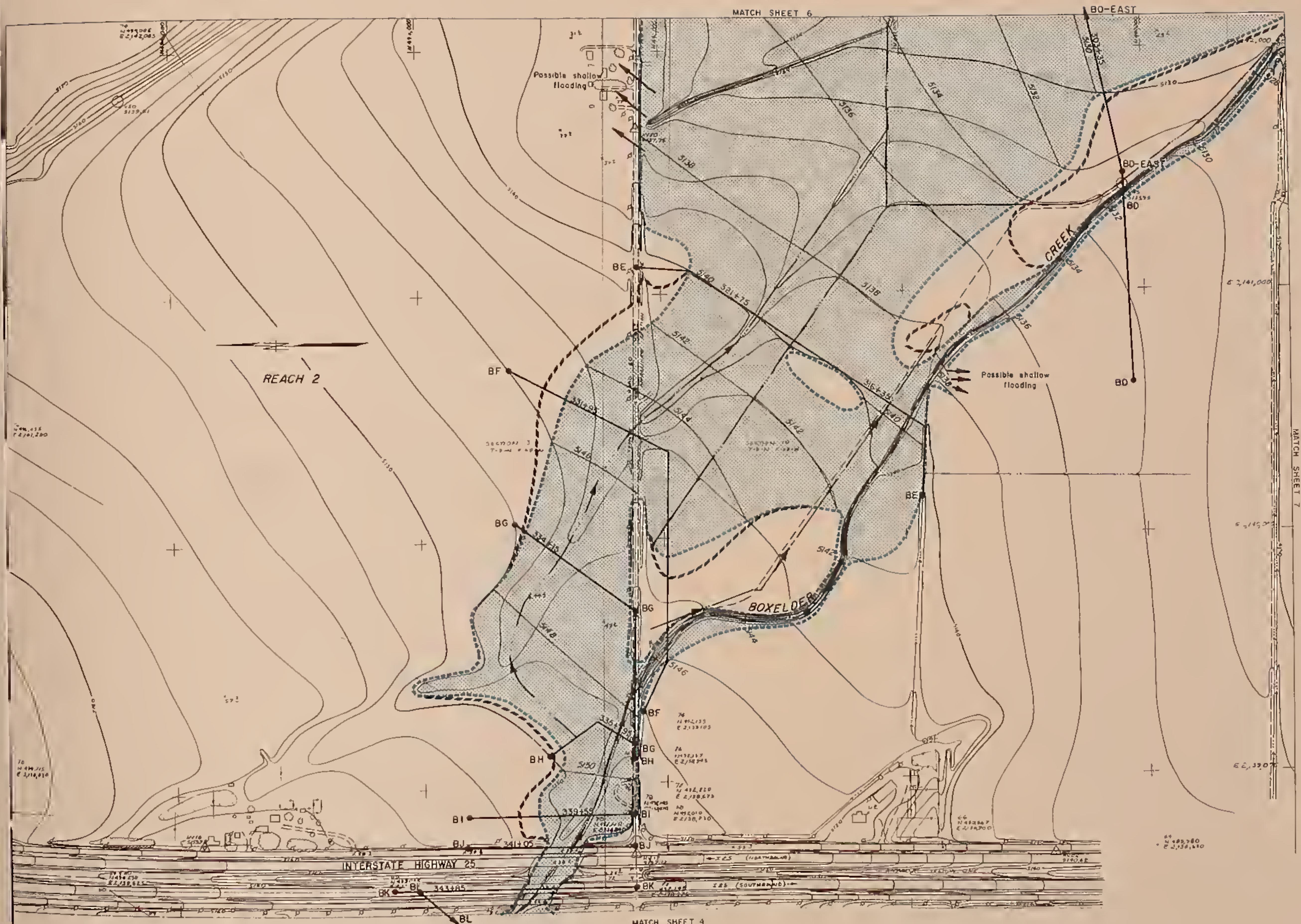
200 0 200 400 600
SCALE IN FEET

SHEET 4 OF 13



LEGEND

FLOOD PLAIN LIMITS

100 YEAR FLOOD
500 YEAR FLOOD

GROUND ELEVATION IN FEET MEAN SEA LEVEL DATUM — 5220
CONTOUR INTERVAL 2.0'
CROSS SECTION — A A
CROSS SECTION CONTINUED — D D
INTERMITTENT STREAM
HORIZONTAL CONTROL — 106
VERTICAL CONTROL — V46 5129.79
PHOTO CENTER
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FLOODED AREAS
FLOOD PLAIN MANAGEMENT STUDY
BOXELDER CREEK IN THE VICINITY
OF THE TOWN OF WELLINGTON IN
LARIMER COUNTY, COLORADO

SCALE 200 0 200 400 600 IN FEET

SHEET 5 OF 13

LEGEND

FLOOD PLAIN LIMITS

100 YEAR FLOOD

500 YEAR FLOOD

GROUND ELEVATION IN FEET MEAN SEA LEVEL DATUM — 5220

CONTOUR INTERVAL 2.0'

CROSS SECTION — A A

CROSS SECTION CONTINUED — D D

INTERMITTENT STREAM

HORIZONTAL CONTROL — 106

VERTICAL CONTROL — V46 512879

PHOTO CENTER

GRID ROINT

100-YEAR FLOOD ELEVATION — 5132

SHEET 1-3

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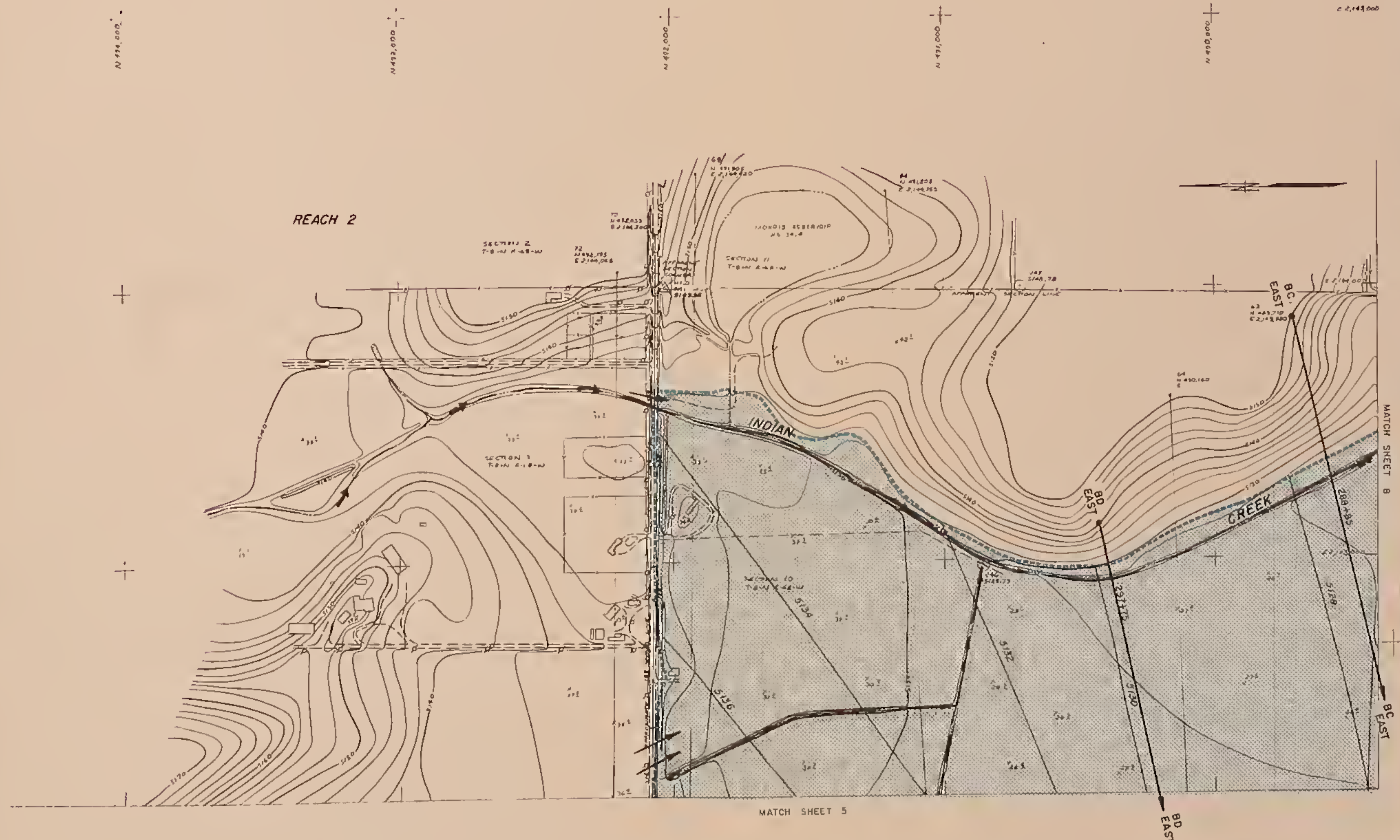
SHEET 12-13

COMPILATION BY PHOTOGRAMMETRIC METHOOS FROM AERIAL PHOTOG-RAPHY TAKEN MAY 4, 1979 BY R & D AEROGRAPHICS, LOVELAND, CO.

THESE MAPS COMPLY WITH NATIONAL MAP ACCURACY STANDARDS.



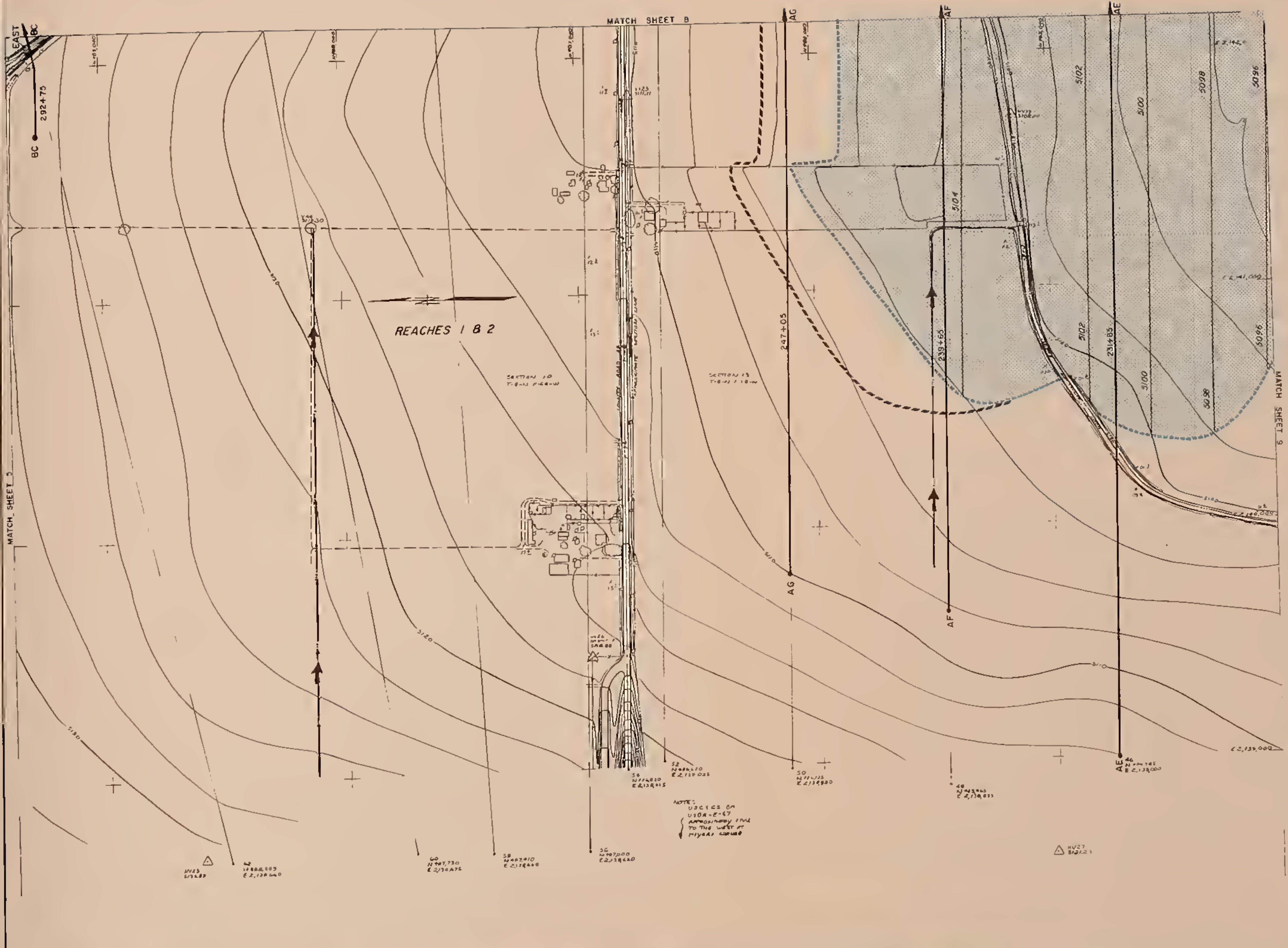
REVISION	DATE	BY

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

FLOODED AREAS
FLOOD PLAIN MANAGEMENT STUDY
BOXELDER CREEK IN THE VICINITY
OF THE TOWN OF WELLINGTON IN
LARIMER COUNTY, COLORADO

SCALE IN FEET: 200 0 200 400 600

SHEET 6 OF 13



LEGEND

FLOOD PLAIN LIMITS

100 YEAR FLOOD

500 YEAR FLOOD

GROUND ELEVATION IN FEET MEAN SEA LEVEL DATUM — 5220

CONTOUR INTERVAL 2.0'

CROSS SECTION

CROSS SECTION CONTINUED

INTERMITTENT STREAM

HORIZONTAL CONTROL

VERTICAL CONTROL

PHOTO CENTER

GRID POINT

100-YEAR FLOOD ELEVATION — 5132

SHEET 1-3

TOPOGRAPHY COMPILED BY PHOTOGRAMMETRIC METHODS FROM AERIAL PHOTOGRAPHY TAKEN MAY 5, 1977. GRID BASED ON COLORADO STATE PLANE COORDINATE SYSTEM, NORTH ZONE, LAMBERT CONFORMAL PROJECTION BY M&I CONSULTING ENGINEERS, FORT COLLINS, CO. BASES OF CONTROL ESTABLISHED FROM U.S. COAST & GEODETIC SURVEY AND U.S. GEOLOGICAL SURVEY CONTROL POINTS. ALL COORDINATES GIVEN ARE CALCULATED AT THE AVERAGE ELEVATION 5200' AND REDUCED TO SEA LEVEL AT AN AVERAGE LATITUDE OF 40°42'30" N. VERTICAL DATUM FROM USGS QUAD. NO. COLORADO 419, LINE NO. 3. COORDINATES: MORRIL ET- Y = 439,554.6 FT. X = 2,098,294.2 FT. LOCKLAND ET- Y = 490,564.2 FT., X = 2,123,392.9 FT.

SHEET 4-11

HORIZONTAL CONTROL IS BASED ON TRIANGULATION STATIONS ADJUSTED TO THE COLORADO STATE PLANE COORDINATE SYSTEM, NORTH ZONE, LAMBERT CONFORMAL PROJECTION. ALL COORDINATE POINTS SHOWN ON THIS MAP HAVE BEEN ADJUSTED TO LOCAL PROJECT DATUM ELEVATION OF 5160.0 FT. & AVERAGE LATITUDE OF 40°40'44". THE ADJUSTMENT FACTOR FOR THE ABOVE ELEVATION & LATITUDE ARE AS FOLLOWS:

SCALE: 0.99998471
SEA LEVEL: 0.99975324
COMBINED FACTOR: 0.99973796
RECIPRICAL FACTOR: 1.00026211

THE FOLLOWING TRIANGULATION STATIONS WERE USED:

STATION	ORDER	COORDINATES NORTHING	EASTING
USGS "WHEAT-ET"	3RD	491,471.7	2,156,422.4
USGS "LOCKMAN ET"	3RD	496,564.2	2,123,392.9

THE FOLLOWING BENCHMARK STATIONS WERE USED:

STATION	ORDER	ELEVATION
P-356	1ST.	5215.140
"DENVER 5202"	1ST	5200.596

THIS MAP WAS COMPILED BY PHOTOGRAMMETRIC METHODS FROM 153 M.M. FOCAL LENGTH VERTICAL AERIAL PHOTOGRAPHY TAKEN ON MARCH 17, 1982 BY NORTHERN COLORADO PHOTOGRAMMETRICS, GREELEY, COLORADO.

SHEET 12-13

COMPILATION BY PHOTOGRAMMETRIC METHODS FROM AERIAL PHOTOGRAPHY TAKEN MAY 4, 1979 BY R & D AEROGRAPHICS, LOVELAND, CO.

THESE MAPS COMPLY WITH NATIONAL MAP ACCURACY STANDARDS.

REVISION	DATE	BY

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

FLOODED AREAS
FLOOD PLAIN MANAGEMENT STUDY BOXELDER CREEK IN THE VICINITY OF THE TOWN OF WELLINGTON IN LARIMER COUNTY, COLORADO

SCALE IN FEET: 200 0 200 400 600

SHEET 7 OF 13

LEGEND

FLOOD PLAIN LIMITS

100 YEAR FLOOD

500 YEAR FLOOD

GROUND ELEVATION IN FEET MEAN SEA LEVEL DATUM

CONTOUR INTERVAL 2.0'

CROSS SECTION

CROSS SECTION CONTINUED

INTERMITTENT STREAM

HORIZONTAL CONTROL

VERTICAL CONTROL

PHOTO CENTER

GRID POINT

100-YEAR FLOOD ELEVATION

SHEET 1-3

TOPOGRAPHY COMPILED BY PHOTOGRAMMETRIC METHODS FROM AERIAL PHOTOGRAPHY TAKEN MAY 5, 1977. GRID BASED ON COLORADO STATE PLANE COORDINATE SYSTEM, NORTH ZONE, LAMBERT CONFORMAL PROJECTION BY M&I CONSULTING ENGINEERS, FORT COLLINS, CO. BASES OF CONTROL ESTABLISHED FROM U.S. COAST & GEODETIC SURVEY AND U.S. GEOLOGICAL SURVEY CONTROL POINTS. ALL COORDINATES GIVEN ARE CALCULATED AT THE AVERAGE ELEVATION 5200' AND REDUCED TO SEA LEVEL AT AN AVERAGE LATITUDE OF 40°42'30" N. VERTICAL DATUM FROM USGS QUAD. NO. COLORADO 419, LINE NO. 3. COORDINATES: MORRIL ET- Y = 439,554.6 FT. X = 2,098,294.2 FT. LOCKLAND ET- Y = 490,564.2 FT., X = 2,123,392.9 FT.

SHEET 4-11

HORIZONTAL CONTROL IS BASED ON TRIANGULATION STATIONS ADJUSTED TO THE COLORADO STATE PLANE COORDINATE SYSTEM, NORTH ZONE, LAMBERT CONFORMAL PROJECTION. ALL COORDINATE POINTS SHOWN ON THIS MAP HAVE BEEN ADJUSTED TO LOCAL PROJECT DATUM ELEVATION OF 5160.0 FT. & AVERAGE LATITUDE OF 40°40'44". THE ADJUSTMENT FACTOR FOR THE ABOVE ELEVATION & LATITUDE ARE AS FOLLOWS:

SCALE: 0.99998471
SEA LEVEL: 0.99975324
COMBINED FACTOR: 0.99973796
RECIPRICAL FACTOR: 1.00026211

THE FOLLOWING TRIANGULATION STATIONS WERE USED:

STATION	ORDER	COORDINATES NORTHING	EASTING
USGS "WHEAT-ET"	3RD	491,471.7	2,156,422.4
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THE FOLLOWING BENCHMARK STATIONS WERE USED:

STATION	ORDER	ELEVATION
P-356	1ST	5215.140
"DENVER 5202"	1ST	5200.596

THIS MAP WAS COMPILED BY PHOTOGRAMMETRIC METHODS FROM 153 M.M. FOCAL LENGTH VERTICAL AERIAL PHOTOGRAPHY TAKEN ON MARCH 17, 1982 BY NORTHERN COLORADO PHOTOGRAMMETRICS, GREELEY, COLORADO.

SHEET 12-13

COMPILATION BY PHOTOGRAMMETRIC METHODS FROM AERIAL PHOTOGRAPHY TAKEN MAY 4, 1979 BY R&D AEROGRAPHICS, LOVELAND, CO.

THESE MAPS COMPLY WITH NATIONAL MAP ACCURACY STANDARDS.

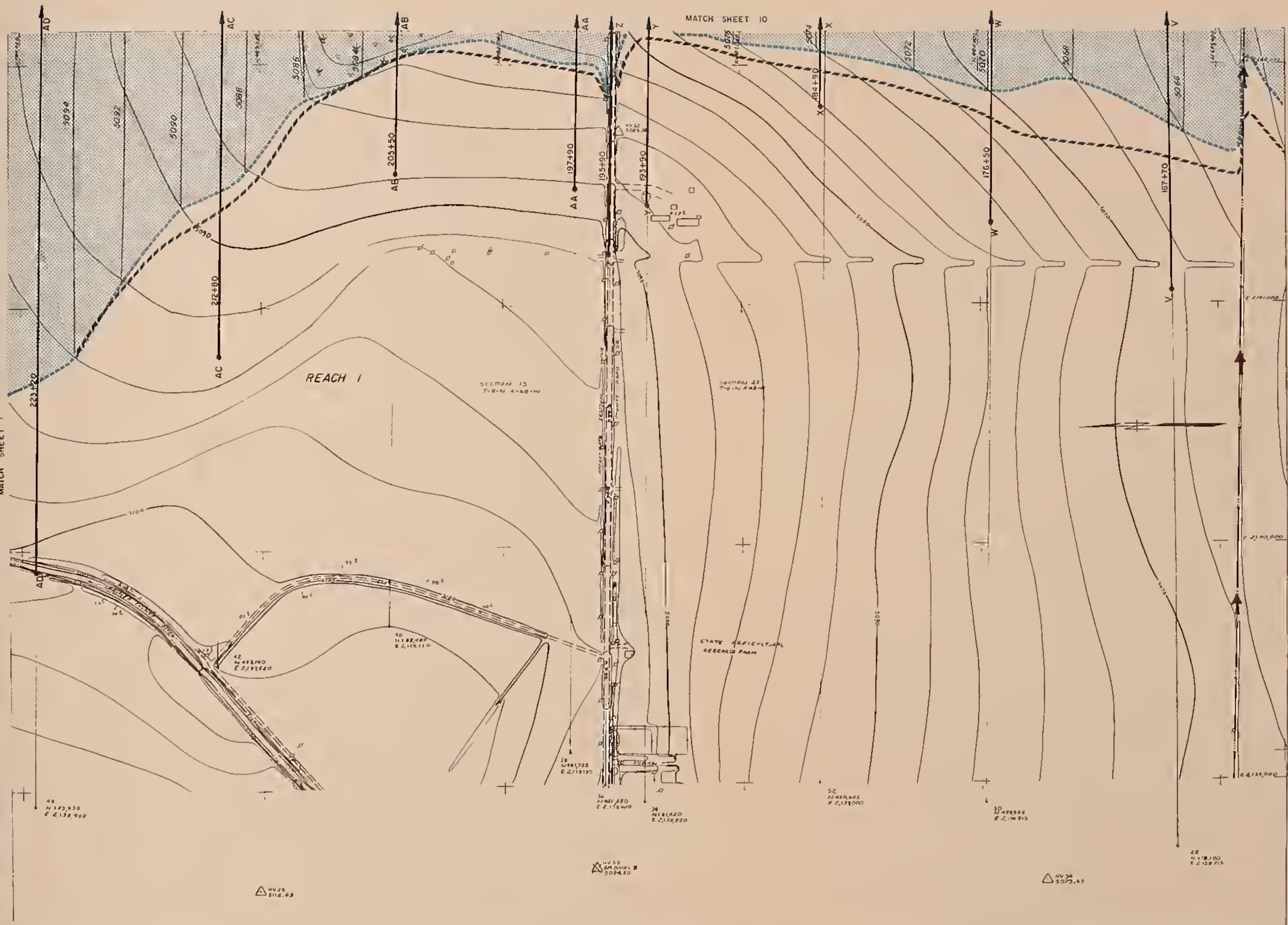
REVISION	DATE	BY

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

FLOODED AREAS
FLOOD PLAIN MANAGEMENT STUDY
BOXELDER CREEK IN THE VICINITY
OF THE TOWN OF WELLINGTON IN
LARIMER COUNTY, COLORADO

SCALE 200 0 200 400 600 IN FEET

SHEET 8 OF 13



LEGEND

FLOOD PLAIN LIMITS

100 YEAR FLOOD
500 YEAR FLOOD

GROUND ELEVATION IN FEET MEAN SEA LEVEL DATUM — 5220
CONTOUR INTERVAL 2.0'
CROSS SECTION — A — A
CROSS SECTION CONTINUED — D — D
INTERMITTENT STREAM
HORIZONTAL CONTROL — 106
VERTICAL CONTROL — V46 5129.79
PHOTO CENTER
GRID POINT
100-YEAR FLOOD ELEVATION — 5192

SHEET 1-3
TOPOGRAPHY COMPILED BY PHOTOGRAMMETRIC METHODS FROM AERIAL PHOTOGRAPHY TAKEN MAY 5, 1977. GRID BASED ON COLORADO STATE PLANE COORDINATE SYSTEM, NORTH ZONE, LAMBERT CONFORMAL PROJECTION BY MBI CONSULTING ENGINEERS, FORT COLLINS, CO. BASES OF CONTROL ESTABLISHED FROM U.S. COAST & GEODETIC SURVEY AND U.S. GEOLOGICAL SURVEY CONTROL POINTS. ALL COORDINATES GIVEN ARE CALCULATED AT THE AVERAGE ELEVATION 5200' AND REDUCED TO SEA LEVEL AT AN AVERAGE LATITUDE OF 40°42'30" N. VERTICAL DATUM FROM USGS QUAD. NO. COLORADO 419, LINE NO. 3. COORDINATES: MORRIL ET- Y= 439,554.6 FT. X: 2,098,294.2 FT. LOCKLAND ET-Y: 490,564.2 FT., X: 2,123,392.9 FT.

SHEET 4-11
HORIZONTAL CONTROL IS BASED ON TRIANGULATION STATIONS ADJUSTED TO THE COLORADO STATE PLANE COORDINATE SYSTEM, NORTH ZONE, LAMBERT CONFORMAL PROJECTION. ALL COORDINATE POINTS SHOWN ON THIS MAP HAVE BEEN ADJUSTED TO LOCAL PROJECT DATUM ELEVATION OF 5160.0 FT. & AVERAGE LATITUDE OF 40°40'44". THE ADJUSTMENT FACTOR FOR THE ABOVE ELEVATION & LATITUDE ARE AS FOLLOWS:

SCALE. 0.99998471
SEA LEVEL: 0.99975324
COMBINED FACTOR: 0.99973796
RECIPRICAL FACTOR: 1.00026211

THE FOLLOWING TRIANGULATION STATIONS WERE USED:

STATION	ORDER	COORDINATES NORTHING	EASTING
USGS "WHEAT-ET"	3RD	491, 471 7	2,156,422.4
USGS "LOCKMAN ET"	3RD	496,564.2	2,123,392.9

THE FOLLOWING BENCHMARK STATIONS WERE USED:

STATION	ORDER	ELEVATION
P-356	1ST	5215.140
"DENVER 5202"	1ST	5200 596

THIS MAP WAS COMPILED BY PHOTOGRAMMETRIC METHODS FROM 153 M.M. FOCAL LENGTH VERTICAL AERIAL PHOTOGRAPHY TAKEN ON MARCH 17, 1982 BY NORTHERN COLORADO PHOTOGRAMMETRICS, GREELEY, COLORADO.

SHEET 12-13
COMPILATION BY PHOTOGRAMMETRIC METHODS FROM AERIAL PHOTOGRAPHY TAKEN MAY 4, 1979 BY R B O AEROGRAPHICS, LOVELAND, CO.

THESE MAPS COMPLY WITH NATIONAL MAP ACCURACY STANDARDS

REVISION	DATE	BY

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

FLOODED AREAS
FLOOD PLAIN MANAGEMENT STUDY
BOXELDER CREEK IN THE VICINITY
OF THE TOWN OF WELLINGTON IN
LARIMER COUNTY, COLORADO

SCALE 200 0 200 400 600 IN FEET

SHEET 9 OF 13

LEGEND

FLOOD PLAIN LIMITS

100 YEAR FLOOD
500 YEAR FLOOD

GROUND ELEVATION IN FEET MEAN SEA LEVEL DATUM — 5220
CONTOUR INTERVAL 2.0'
CROSS SECTION — A A
CROSS SECTION CONTINUED — D D
INTERMITTENT STREAM
HORIZONTAL CONTROL — 106
VERTICAL CONTROL — V46 5123.79
PHOTO CENTER
GRID POINT
100-YEAR FLOOD ELEVATION — 5132

SHEET 1-3
TOPOGRAPHY COMPILEO BY PHOTOGRAMMETRIC METHODS FROM AERIAL PHOTOGRAPHY TAKEN MAY 5, 1977. GRIO BASEO ON COLORADO STATE PLANE COORDINATE SYSTEM, NORTH ZONE, LAMBERT CONFORMAL PROJECTION BY M&I CONSULTING ENGINEERS, FORT COLLINS, CO. BASES OF CONTROL ESTABLISHED FROM U.S. COAST & GEODETIC SURVEY AND U.S. GEOLOGICAL SURVEY CONTROL POINTS. ALL CO-ORDINATES GIVEN ARE CALCULATEO AT THE AVERAGE ELEVATION 5200' ANO REOUCED TO SEA LEVEL AT AN AVERAGE LATITUOE OF 40°42'30" N. VERTICAL DATUM FROM USGS QUAD NO. COLORADO 419, LINE NO. 3. COORDINATES: MORRIL ET- Y = 439,554.6 FT. X = 2,098,294.2 FT. LOCKLANO ET- Y = 490,564.2 FT., X = 2,123,392.9 FT.

SHEET 4 - 11
HORIZONTAL CONTROL IS BASED ON TRIANGULATION STATIONS ADJUSTEO TO THE COLORADO STATE PLANE COORDINATE SYSTEM, NORTH ZONE, LAMBERT CONFORMAL PROJECTION. ALL COORDINATE POINTS SHOWN ON THIS MAP HAVE BEEN ADJUSTEO TO LOCAL PROJECT OATUM ELEVATION OF 5160.0 FT. & AVERAGE LATITUOE OF 40°40'44". THE ADJUSTMENT FACTOR FOR THE ABOVE ELEVATION & LATITUDE ARE AS FOLLOWS:

SCALE: 0.99998471
SEA LEVEL: 0.99975324
COMBINEO FACTOR: 0.99973796
RECIPRICAL FACTOR: 1.00026211

THE FOLLOWING TRIANGULATION STATIONS WERE USEO:

STATION	ORDER	COORDINATES NORTHING	EASTING
USGS "WHEAT-ET"	3RD	491, 471.7	2,156,422.4
USGS "LOCKMAN ET"	3RD	496,564.2	2,123,392.9

THE FOLLOWING BENCHMARK STATIONS WERE USED:

STATION	ORDER	ELEVATION
P-356	1ST.	5215.140
"DENVER 5202"	1ST	5200.596

THIS MAP WAS COMPILED BY PHOTOGRAMMETRIC METHOOS FROM 153 M.M. FOCAL LENGTH VERTICAL AERIAL PHOTOGRAPHY TAKEN ON MARCH 17, 1982 BY NORTHERN COLORADO PHOTOGRAMMETRICS, GREELEY, COLORADO.

SHEET 12 - 13
COMPILATION BY PHOTOGRAMMETRIC METHOOS FROM AERIAL PHOTOGRAPHY TAKEN MAY 4, 1979 BY R & O AEROGRAPHICS, LOVELAND, CO.

THESE MAPS COMPLY WITH NATIONAL MAP ACCURACY STANDAROS.

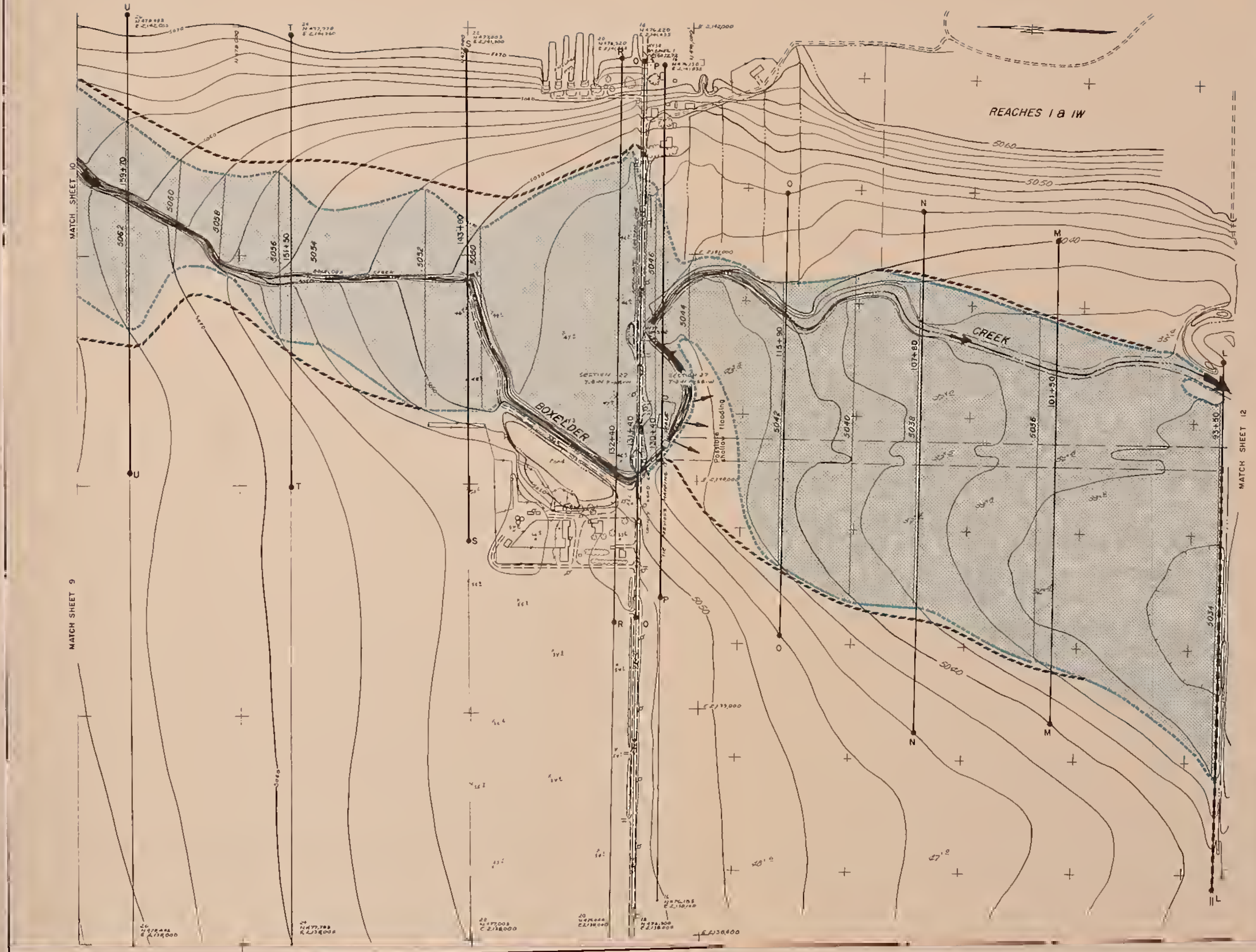
REVISION	DATE	BY

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

FLOODED AREAS
FLOOD PLAIN MANAGEMENT STUDY
BOXELDER CREEK IN THE VICINITY
OF THE TOWN OF WELLINGTON IN
LARIMER COUNTY, COLORADO

SCALE IN FEET: 200 0 200 400 600

SHEET 10 OF 13



LEGEND

FLOOD PLAIN LIMITS

100 YEAR FLOOD

500 YEAR FLOOD

GROUND ELEVATION IN FEET MEAN SEA LEVEL DATUM — 5220

CONTOUR INTERVAL 2.0'

CROSS SECTION — A A

CROSS SECTION CONTINUED — O O

INTERMITTENT STREAM

HORIZONTAL CONTROL — Δ^{100}

VERTICAL CONTROL — V46 5129.79

PHOTO CENTER

GRID POINT

100-YEAR FLOOD ELEVATION — 5132

SHEET 1-3

TOPOGRAPHY COMPILED BY PHOTOGRAMMETRIC METHODS FROM AERIAL PHOTOGRAPHY TAKEN MAY 5, 1977. GRID BASED ON COLORADO STATE PLANE COORDINATE SYSTEM, NORTH ZONE, LAMBERT CONFORMAL PROJECTION BY M&I CONSULTING ENGINEERS, FORT COLLINS, CO. BASES OF CONTROL ESTABLISHED FROM U.S. COAST & GEODETIC SURVEY AND U.S. GEOLOGICAL SURVEY CONTROL POINTS. ALL COORDINATES GIVEN ARE CALCULATED AT THE AVERAGE ELEVATION 5200' AND REDUCED TO SEA LEVEL AT AN AVERAGE LATITUDE OF 40°42'30" N. VERTICAL DATUM FROM USGS QUAD NO. COLORADO 419, LINE NO. 3. COORDINATES: MORRIL ET- Y = 439,554.6 FT. X = 2,098,294.2 FT. LOCKLAND ET- Y = 490,564.2 FT., X = 2,123,392.9 FT.

SHEET 4 - 11

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RECIPRICAL FACTOR: 1.00026211

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STATION	ORDER	COORDINATES NORTHING	EASTING
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"DENVER 5202"	1ST	5200.596

THIS MAP WAS COMPILED BY PHOTOGRAMMETRIC METHODS FROM 153 M.M. FOCAL LENGTH VERTICAL AERIAL PHOTOGRAPHY TAKEN ON MARCH 17, 1982 BY NORTHERN COLORADO PHOTOGRAMMETRICS, GREELEY, COLORADO.

SHEET 12 - 13

COMPILATION BY PHOTOGRAMMETRIC METHODS FROM AERIAL PHOTOGRAPHY TAKEN MAY 4, 1979 BY R & D AEROGRAPHICS, LOVELAND, CO.

THESE MAPS COMPLY WITH NATIONAL MAP ACCURACY STANDARDS.

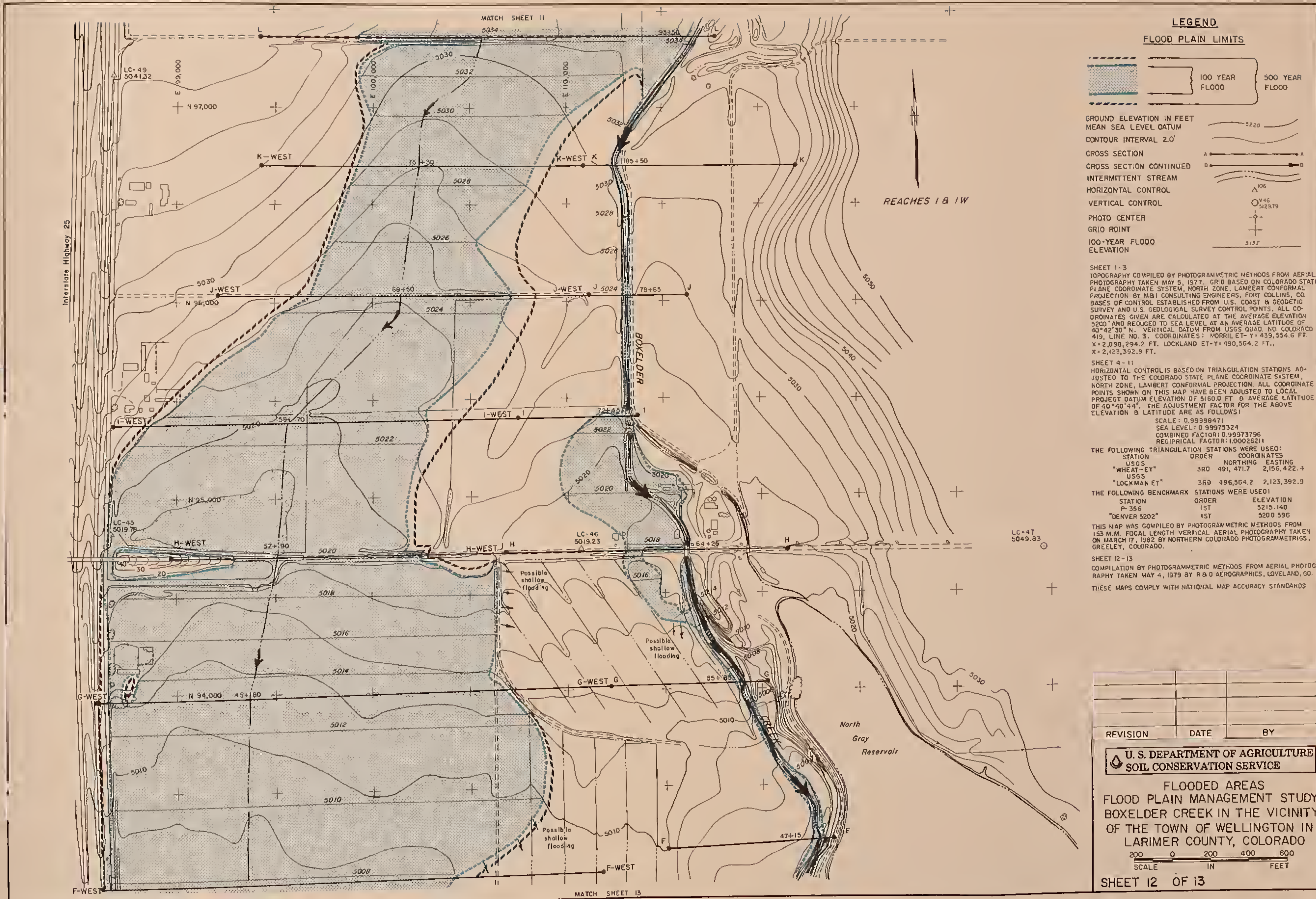
REVISION	DATE	BY

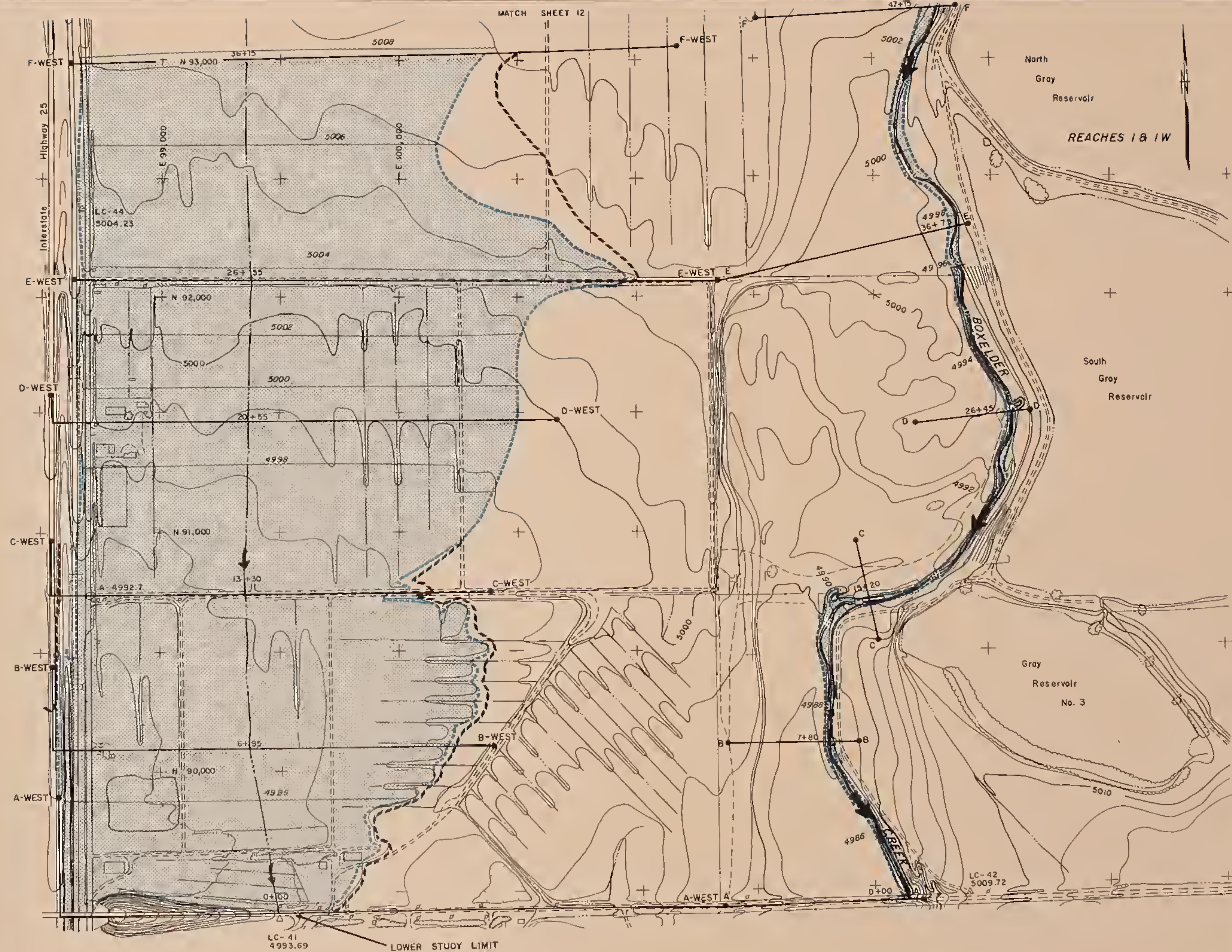
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

FLOODED AREAS
FLOOD PLAIN MANAGEMENT STUDY
BOXELDER CREEK IN THE VICINITY
OF THE TOWN OF WELLINGTON IN
LARIMER COUNTY, COLORADO

SCALE 200 0 200 400 600 IN FEET

SHEET 11 OF 13


LEGEND
FLOOD PLAIN LIMITS
100 YEAR FLOOD
500 YEAR FLOOD
GROUND ELEVATION IN FEET MEAN SEA LEVEL DATUM
CONTOUR INTERVAL 2.0'
CROSS SECTION
CROSS SECTION CONTINUED
INTERMITTENT STREAM
HORIZONTAL CONTROL
VERTICAL CONTROL
PHOTO CENTER
GRID POINT
100-YEAR FLOOD ELEVATION
SHEET 1-3
TOPOGRAPHY COMPILED BY PHOTOGRAMMETRIC METHODS FROM AERIAL PHOTOGRAPHY TAKEN MAY 5, 1977. GRID BASED ON COLORADO STATE PLANE COORDINATE SYSTEM, NORTH ZONE, LAMBERT CONFORMAL PROJECTION BY M&I CONSULTING ENGINEERS, FORT COLLINS, CO. BASES OF CONTROL ESTABLISHED FROM U.S. COAST & GEODETIC SURVEY AND U.S. GEOLOGICAL SURVEY CONTROL POINTS. ALL COORDINATES GIVEN ARE CALCULATED AT THE AVERAGE ELEVATION 5200' AND REDUCED TO SEA LEVEL AT AN AVERAGE LATITUDE OF 40°42'30" N. VERTICAL DATUM FROM USGS QUAD. NO. COLORADO 419, LINE NO. 3. COORDINATES: MORRIL ET- Y = 439,554.6 FT. X = 2,098,294.2 FT. LOCKLAND ET- Y = 490,564.2 FT., X = 2,123,392.9 FT.
SHEET 4-11
HORIZONTAL CONTROL IS BASED ON TRIANGULATION STATIONS ADJUSTED TO THE COLORADO STATE PLANE COORDINATE SYSTEM, NORTH ZONE, LAMBERT CONFORMAL PROJECTION. ALL COORDINATE POINTS SHOWN ON THIS MAP HAVE BEEN ADJUSTED TO LOCAL PROJECT DATUM ELEVATION OF 5160.0 FT & AVERAGE LATITUDE OF 40°40'44". THE ADJUSTMENT FACTOR FOR THE ABOVE ELEVATION & LATITUDE ARE AS FOLLOWS:
SCALE: 0.99998471
SEA LEVEL: 0.99975324
COMBINED FACTOR: 0.99973796
RECIPRICAL FACTOR: 1.00026211
THE FOLLOWING TRIANGULATION STATIONS WERE USED:
STATION ORDER COORDINATES NORTHING EASTING
USGS "WHEAT-ET" 3RD 491,471.7 2,156,422.4
USGS "LOCKMAN ET" 3RD 496,564.2 2,123,392.9
THE FOLLOWING BENCHMARK STATIONS WERE USED:
STATION ORDER ELEVATION
P-356 1ST 5215.140
"DENVER 5202" 1ST 5200.596
THIS MAP WAS COMPILED BY PHOTOGRAMMETRIC METHODS FROM 153 M.M. FOCAL LENGTH VERTICAL AERIAL PHOTOGRAPHY TAKEN ON MARCH 17, 1982 BY NORTHERN COLORADO PHOTOGRAMMETRICS, GREELEY, COLORADO.
SHEET 12-13
COMPILATION BY PHOTOGRAMMETRIC METHODS FROM AERIAL PHOTOGRAPHY TAKEN MAY 4, 1979 BY R & D AEROGRAPHICS, LOVELAND, CO.
THESE MAPS COMPLY WITH NATIONAL MAP ACCURACY STANDARDS
MATCH SHEET 11
MATCH SHEET 13
Interstate Highway 25
REACHES I & IW
BOXELDER
CREEK
North Gray Reservoir
Possible shallow flooding
K-WEST
J-WEST
I-WEST
H-WEST
G-WEST
F-WEST
LC-49 5041.32
LC-45 5019.78
LC-46 5019.23
LC-47 5049.83
N 97,000
N 96,000
N 95,000
N 94,000
E 99,000
E 100,000
E 110,000
REVISION
DATE
BY
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
FLOODED AREAS
FLOOD PLAIN MANAGEMENT STUDY
BOXELDER CREEK IN THE VICINITY
OF THE TOWN OF WELLINGTON IN
LARIMER COUNTY, COLORADO
200 0 200 400 600
SCALE IN FEET
SHEET 12 OF 13



LEGEND

FLOOD PLAIN LIMITS

100 YEAR FLOOD

500 YEAR FLOOD

GROUND ELEVATION IN FEET MEAN SEA LEVEL DATUM — 5220

CONTOUR INTERVAL 2.0'

CROSS SECTION — A A

CROSS SECTION CONTINUED — D D

INTERMITTENT STREAM

HORIZONTAL CONTROL — 106

VERTICAL CONTROL — V46 5129.79

PHOTO CENTER

GRID ROINT

100-YEAR FLOOD ELEVATION — 5132

SHEET 1-3

TOPOGRAPHY COMPILED BY PHOTOGRAMMETRIC METHODS FROM AERIAL PHDTOGRAPHY TAKEN MAY 5, 1977. GRID BASED DN COLDRADO STATE PLANE COORDINATE SYSTEM, NORTH 2ONE, LAMBERT CONFORMAL PROJECTIDN BY M&I CONSULTING ENGINEERS, FDRT COLLINS, CO. BASES DF CONTROL ESTABLISHED FROM U.S. COAST & GEODETIC SURVEY AND U.S. GEDLOGICAL SURVEY CONTROL POINTS. ALL CO-ORDINATES GIVEN ARE CALCULATED AT THE AVERAGE ELEVATIDN 5200' AND REDUCED TO SEA LEVEL AT AN AVERAGE LATITUDE OF 40°42'30" N. VERTICAL DATUM FROM USGS QUAD. NO. COLORADO 419, LINE NO. 3. COORDINATES: MORRIL ET- Y=439,554.6 FT. X=2,098,294.2 FT. LOCKLAND ET- Y=490,564.2 FT., X=2,123,392.9 FT.

SHEET 4-11

HORIZDNTAL CONTRDL IS BASED ON TRIANGULATIDN STATIDNS ADJUSTED TO THE COLORADO STATE PLANE GOORDINATE SYSTEM, NORTH 2DNE, LAMBERT CONFDRMAL PROJECTIDN. ALL COORDINATE POINTS SHOWN DN THIS MAP HAVE BEEN ADJUSTED TO LDCAL PROJECT DATUM ELEVATION DF 5160.D FT & AVERAGE LATITUDE DF 40°40'44". THE ADJUSTMENT FACTOR FOR THE ABOVE ELEVATIDN & LATITUDE ARE AS FDLLOWS:

SCALE: 0.99998471
SEA LEVEL: D.99975324
COMBINED FACTDR: D.99973796
RECIPRIGAL FACTOR: 1.00026211

THE FOLLOWING TRIANGULATIDN STATIONS WERE USED:

STATIDN	DRDER	COORDINATES NORTHING	COORDINATES EASTING
USGS "WHEAT-ET"	3RD	491,471.7	2,156,422.4
USGS "LOCKMAN ET"	3RD	496,564.2	2,123,392.9

THE FOLLOWING BENCHMARK STATIDNS WERE USED:

STATION	DRDER	ELEVATIDN
P-356	IST.	5215.14D
"DENVER 5202"	IST	52DD.596

THIS MAP WAS COMPILED BY PHOTOGRAMMETRIC METHODS FROM 153 M.M. FOCAL LENGTH VERTICAL AERIAL PHOTDGRAPHY TAKEN ON MARCH 17, 1982 BY NORTHERN COLDRADO PHOTOGRAMMETRICS, GREELEY, COLORADO.

SHEET 12-13

COMPILATIDN BY PHDTOGRAMMETRIC METHODS FROM AERIAL PHOTOGRAPHY TAKEN MAY 4, 1979 BY R & D AEROGRAPHICS, LOVELAND, CD.

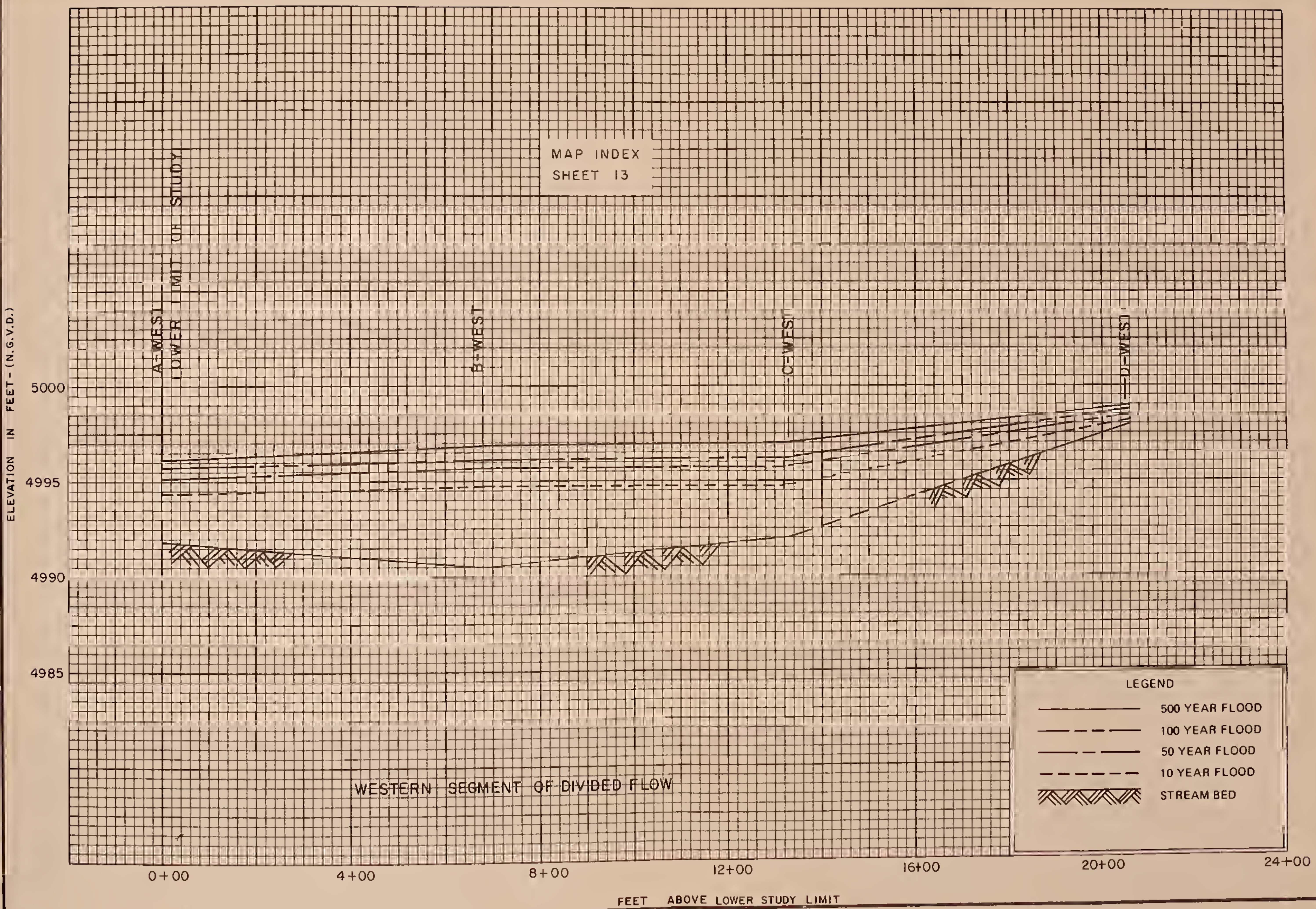
THESE MAPS COMPLY WITH NATIONAL MAP ACCURACY STANDARDS.

REVISION	DATE	BY

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

FLOODED AREAS
FLOOD PLAIN MANAGEMENT STUDY
BOXELDER CREEK IN THE VICINITY
OF THE TOWN OF WELLINGTON IN
LARIMER COUNTY, COLORADO

SCALE IN FEET: 200 0 200 400 600



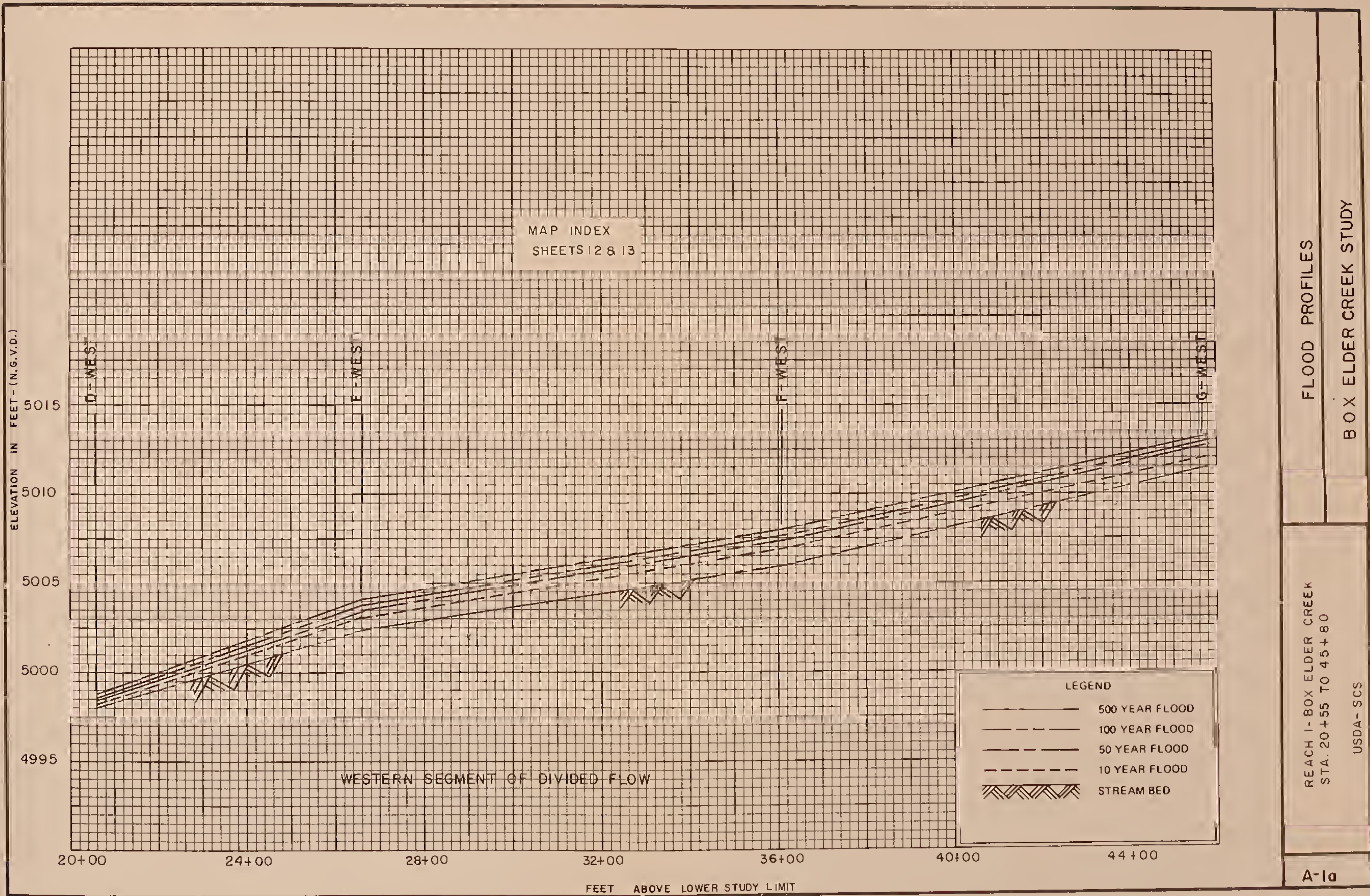
BOX ELDER CREEK STUDY

FLOOD PROFILES

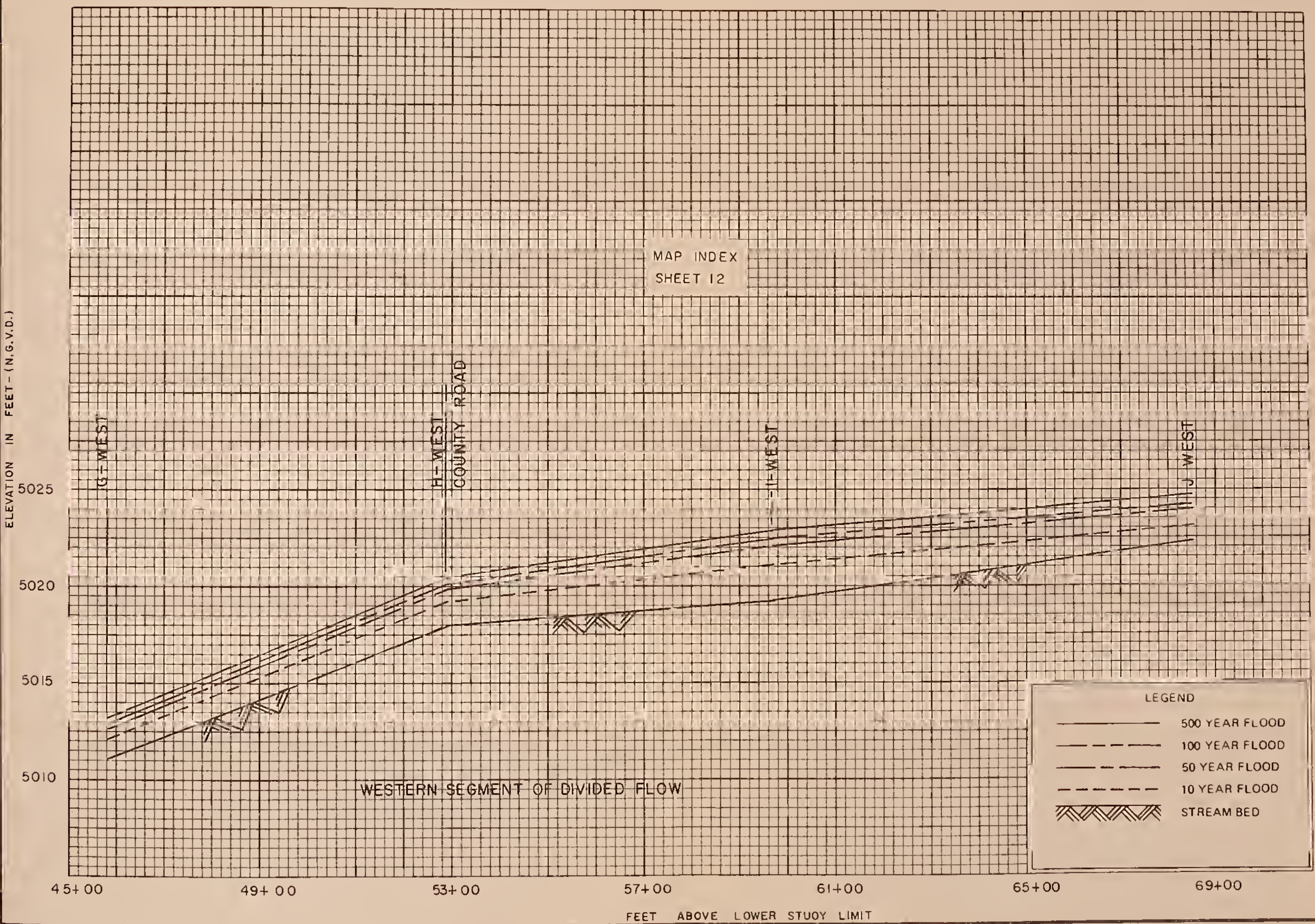
USDA- SCS

REACH I - BOX ELDER CREEK
STA. 0+00 TO STA. 20+55

A-1



MAP INDEX
SHEETS 12 & 13
D-WEST
E-WEST
F-WEST
G-WEST
ELEVATION IN FEET - (N.G.V.D.)
5015
5010
5005
5000
4995
20+00
24+00
28+00
32+00
36+00
40+00
44+00
FEET ABOVE LOWER STUDY LIMIT
WESTERN SEGMENT OF DIVIDED FLOW
LEGEND
500 YEAR FLOOD
100 YEAR FLOOD
50 YEAR FLOOD
10 YEAR FLOOD
STREAM BED
FLOOD PROFILES
BOX ELDER CREEK STUDY
REACH I- BOX ELDER CREEK
STA. 20+55 TO 45+80
USDA-SCS
A-1a



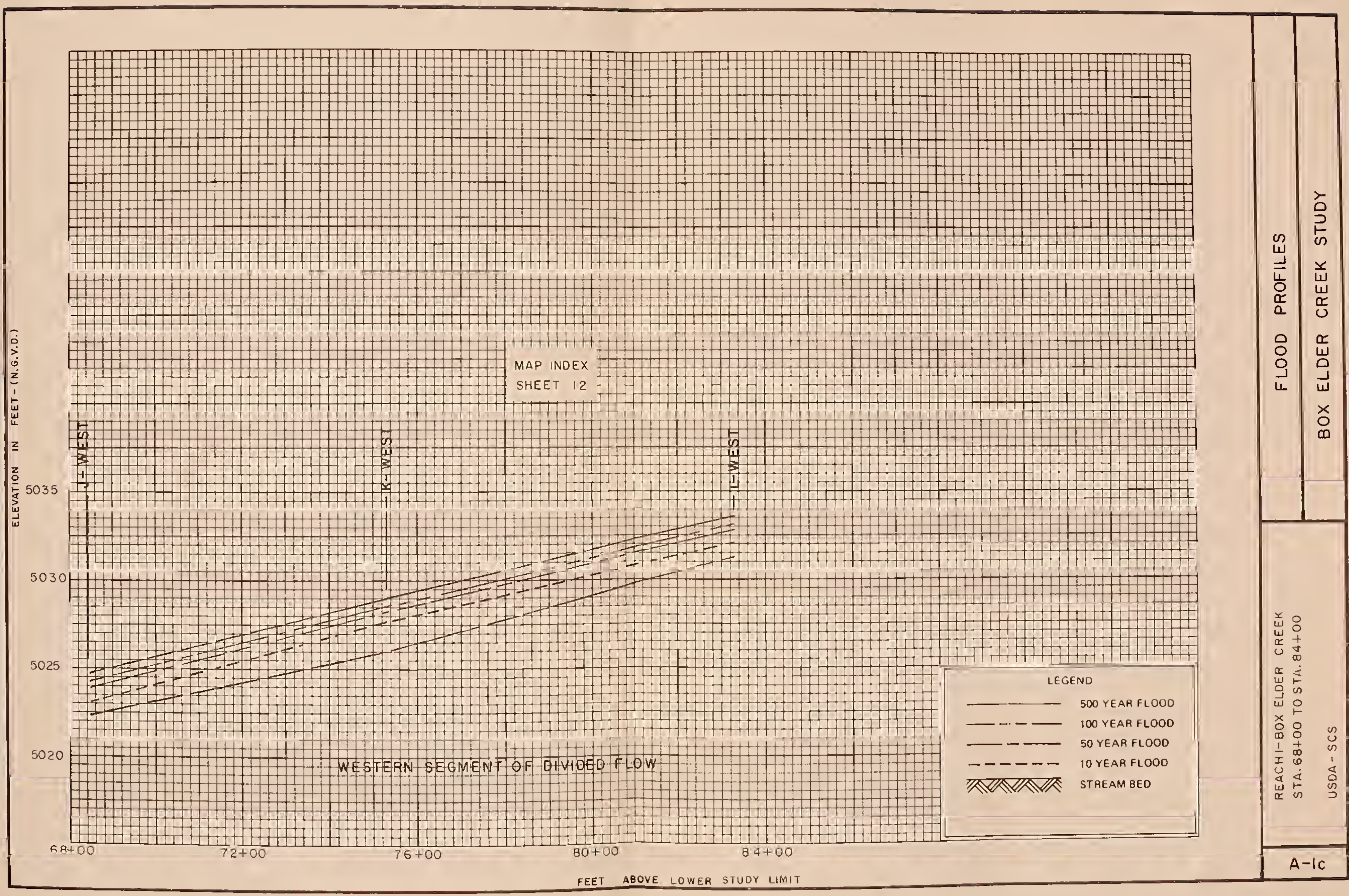
FLOOD PROFILES

BOX ELDER CREEK STUDY

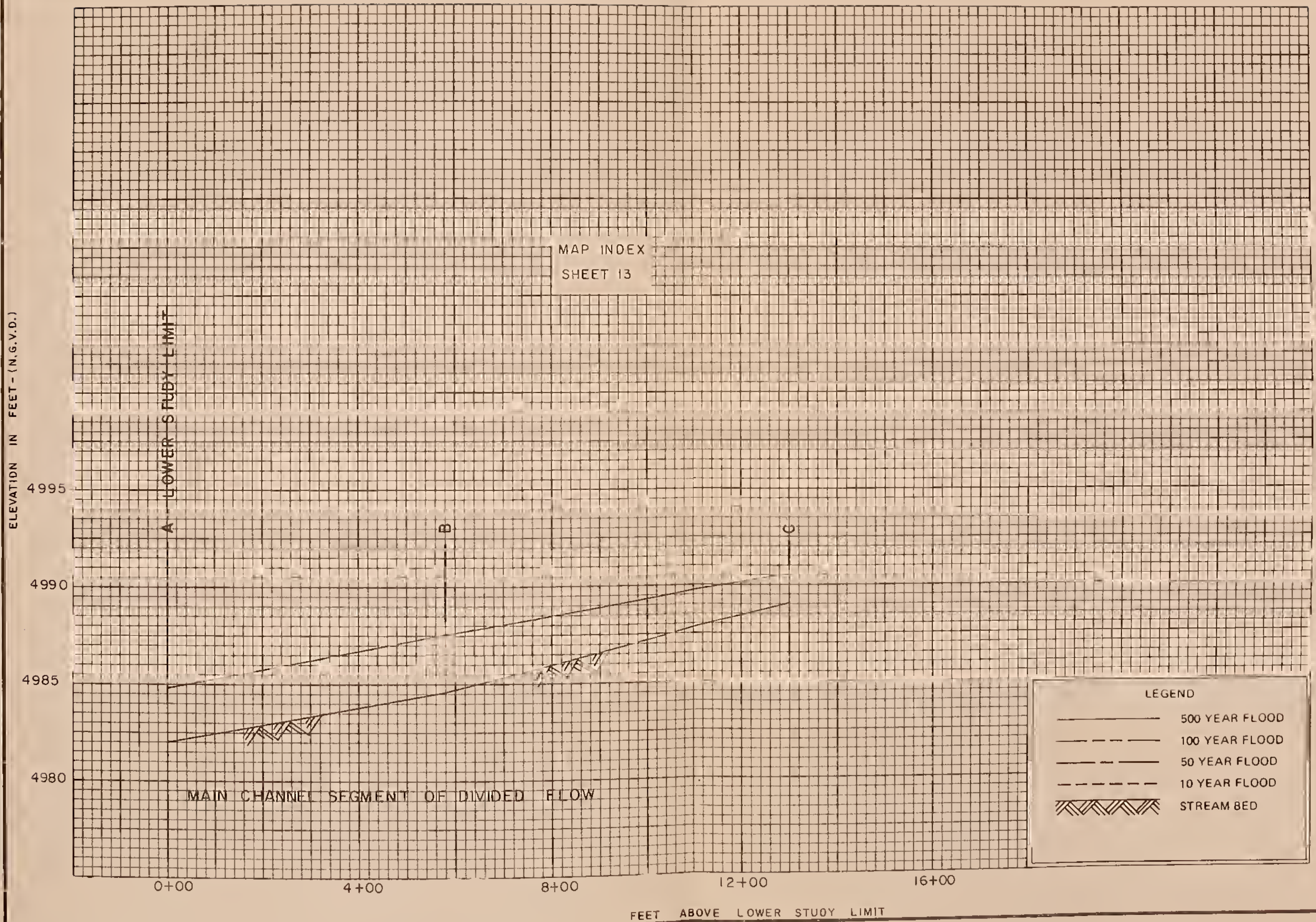
REACH I - BOX ELDER CREEK
STA. 45+00 TO 69+00

USDA- SCS

A-Ib



ELEVATION IN FEET - (N.G.V.D.)
5020
5025
5030
5035
68+00
72+00
76+00
80+00
84+00
FEET ABOVE LOWER STUDY LIMIT
J-WEST
K-WEST
L-WEST
MAP INDEX
SHEET 12
WESTERN SEGMENT OF DIVIDED FLOW
LEGEND
500 YEAR FLOOD
100 YEAR FLOOD
50 YEAR FLOOD
10 YEAR FLOOD
STREAM BED
FLOOD PROFILES
BOX ELDER CREEK STUDY
REACH I - BOX ELDER CREEK
STA. 68+00 TO STA. 84+00
USDA - SCS
A-Ic

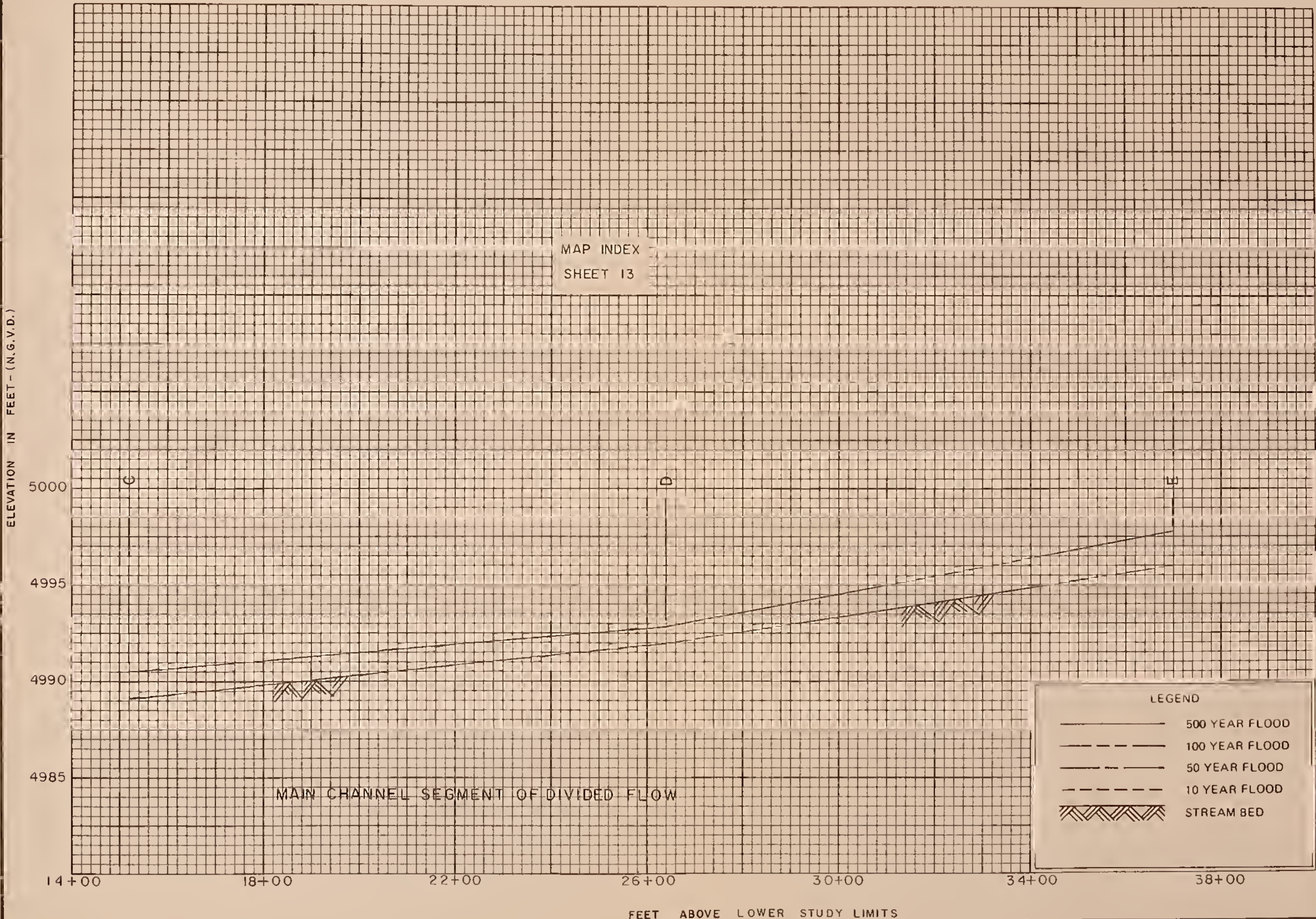


FLOOD PROFILES

BOX ELDER CREEK STUDY

REACH I - BOX ELDER CREEK
STA. 0+00 TO 15+20
USDA-SCS

A-Id



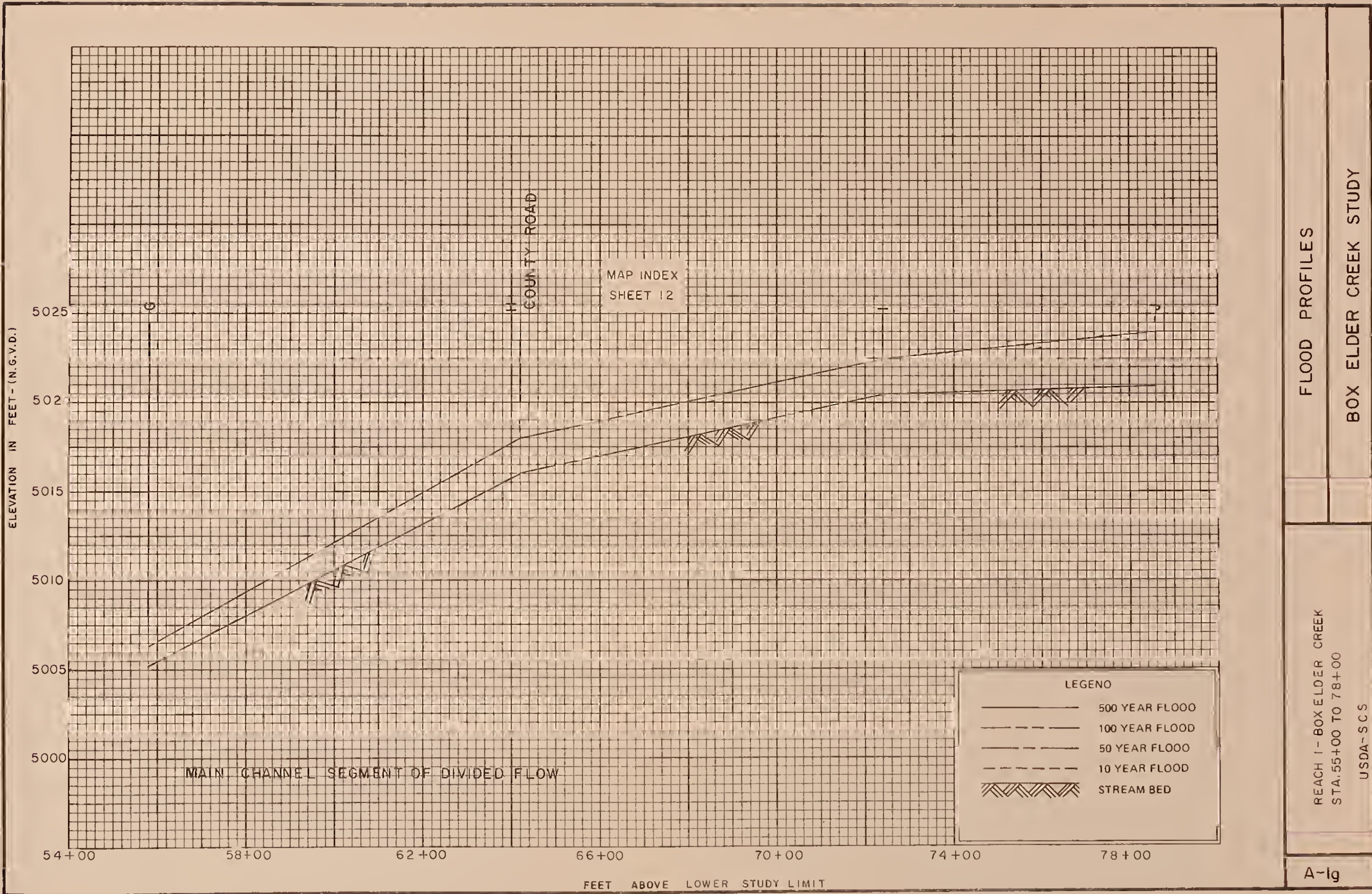
FLOOD PROFILES

BOX ELDER CREEK STUDY

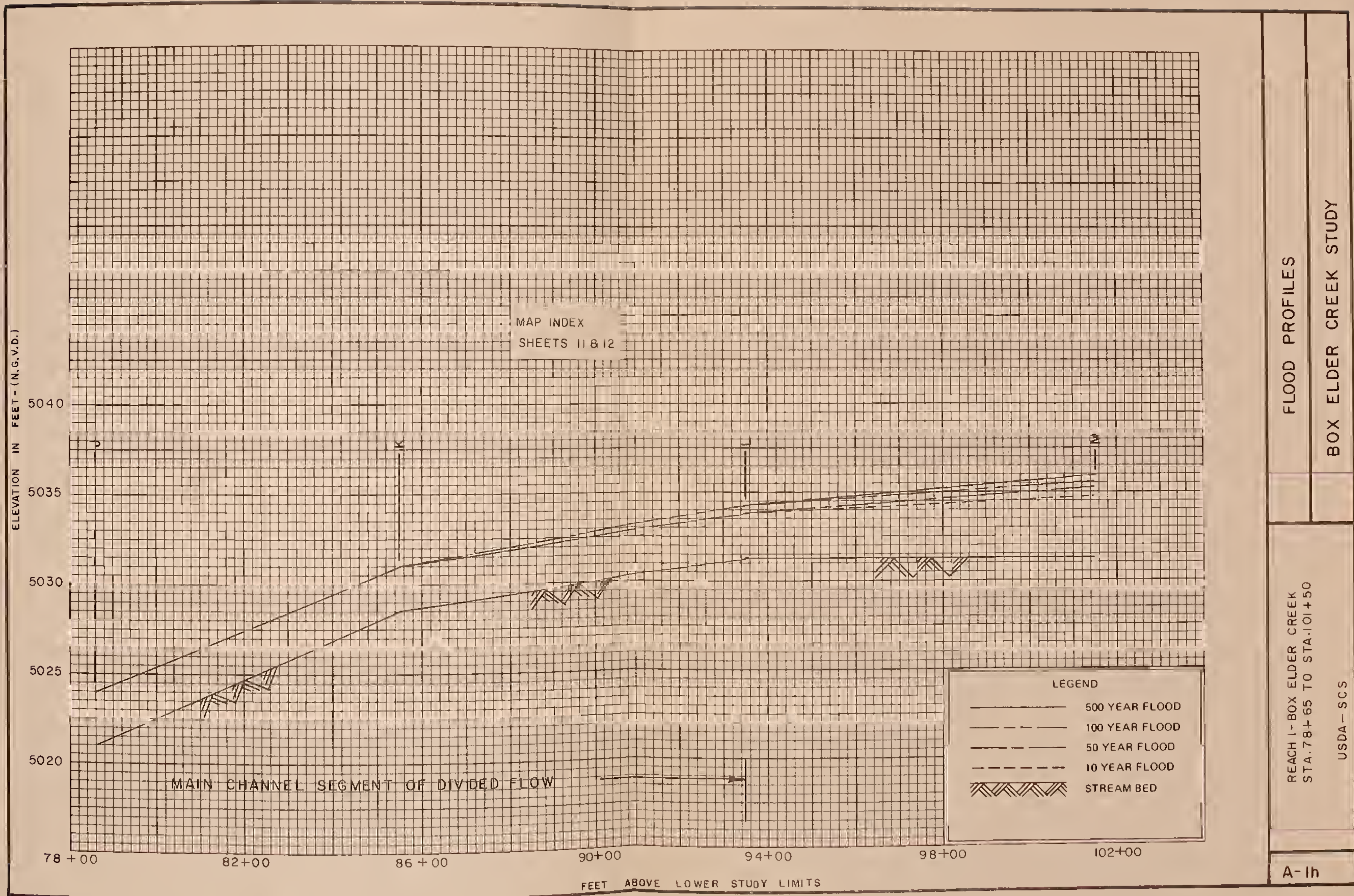
REACH I - BOX ELDER CREEK
STA. 15+20 TO 36+75

USDA - SCS

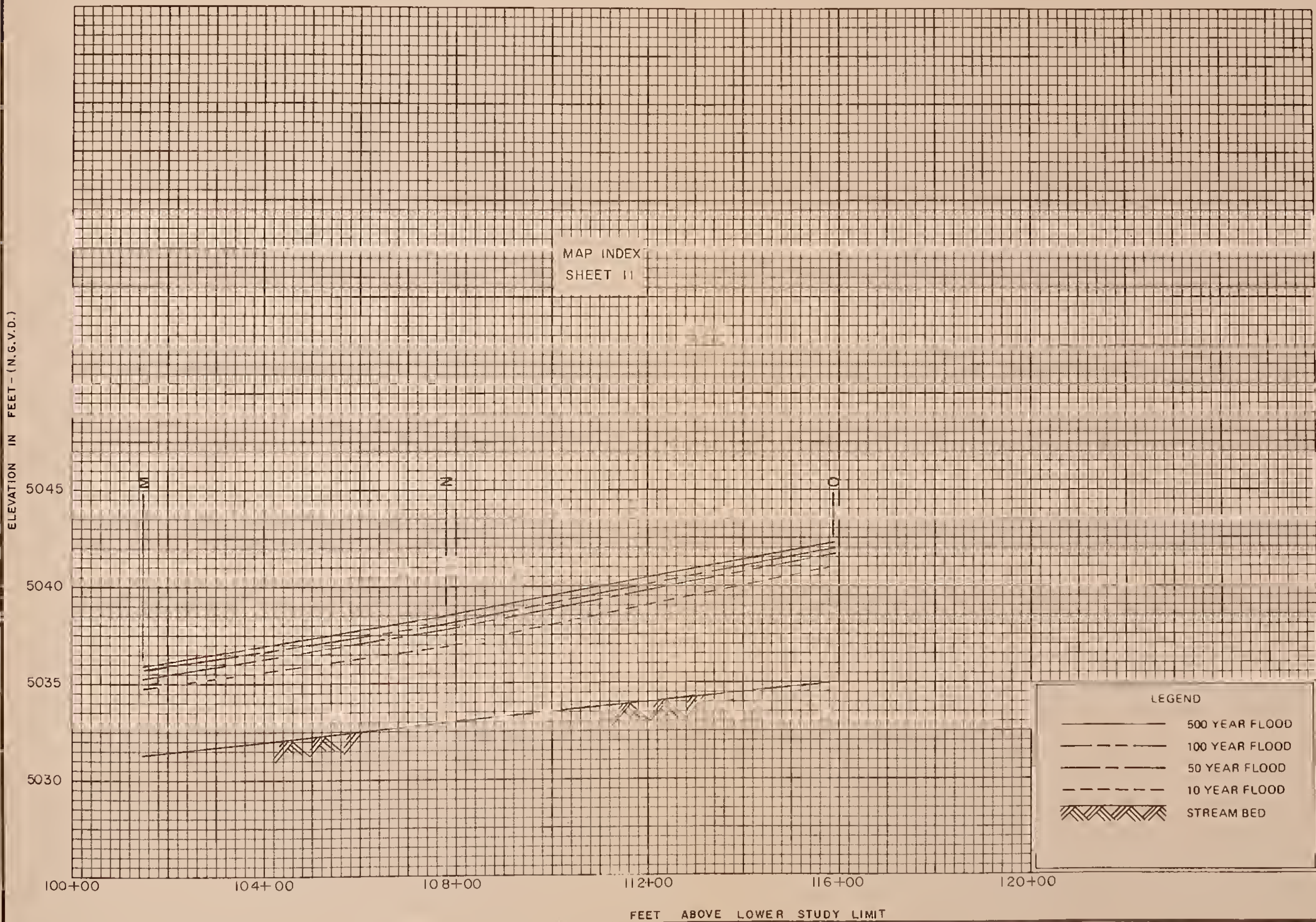
A-1e



ELEVATION IN FEET - (N.G.V.D.)
FEET ABOVE LOWER STUDY LIMIT
5025
5020
5015
5010
5005
5000
54+00
58+00
62+00
66+00
70+00
74+00
78+00
G
H
I
J
COUNTY ROAD
MAP INDEX
SHEET 12
MAIN CHANNEL SEGMENT OF DIVIDED FLOW
LEGENO
500 YEAR FLOOO
100 YEAR FLOOD
50 YEAR FLOOO
10 YEAR FLOOD
STREAM BED
FLOOD PROFILES
BOX ELDER CREEK STUDY
REACH I - BOX ELDER CREEK
STA.55+00 TO 78+00
USDA-SCS
A-Ig



MAP INDEX
SHEETS 11 & 12
ELEVATION IN FEET - (N.G.V.D.)
5040
5035
5030
5025
5020
J
K
L
M
MAIN CHANNEL SEGMENT OF DIVIDED FLOW
LEGEND
500 YEAR FLOOD
100 YEAR FLOOD
50 YEAR FLOOD
10 YEAR FLOOD
STREAM BED
78 + 00
82+00
86 + 00
90+00
94+00
98+00
102+00
FEET ABOVE LOWER STUDY LIMITS
FLOOD PROFILES
BOX ELDER CREEK STUDY
REACH I - BOX ELDER CREEK
STA. 78+65 TO STA. 101+50
USDA - SCS
A-1h

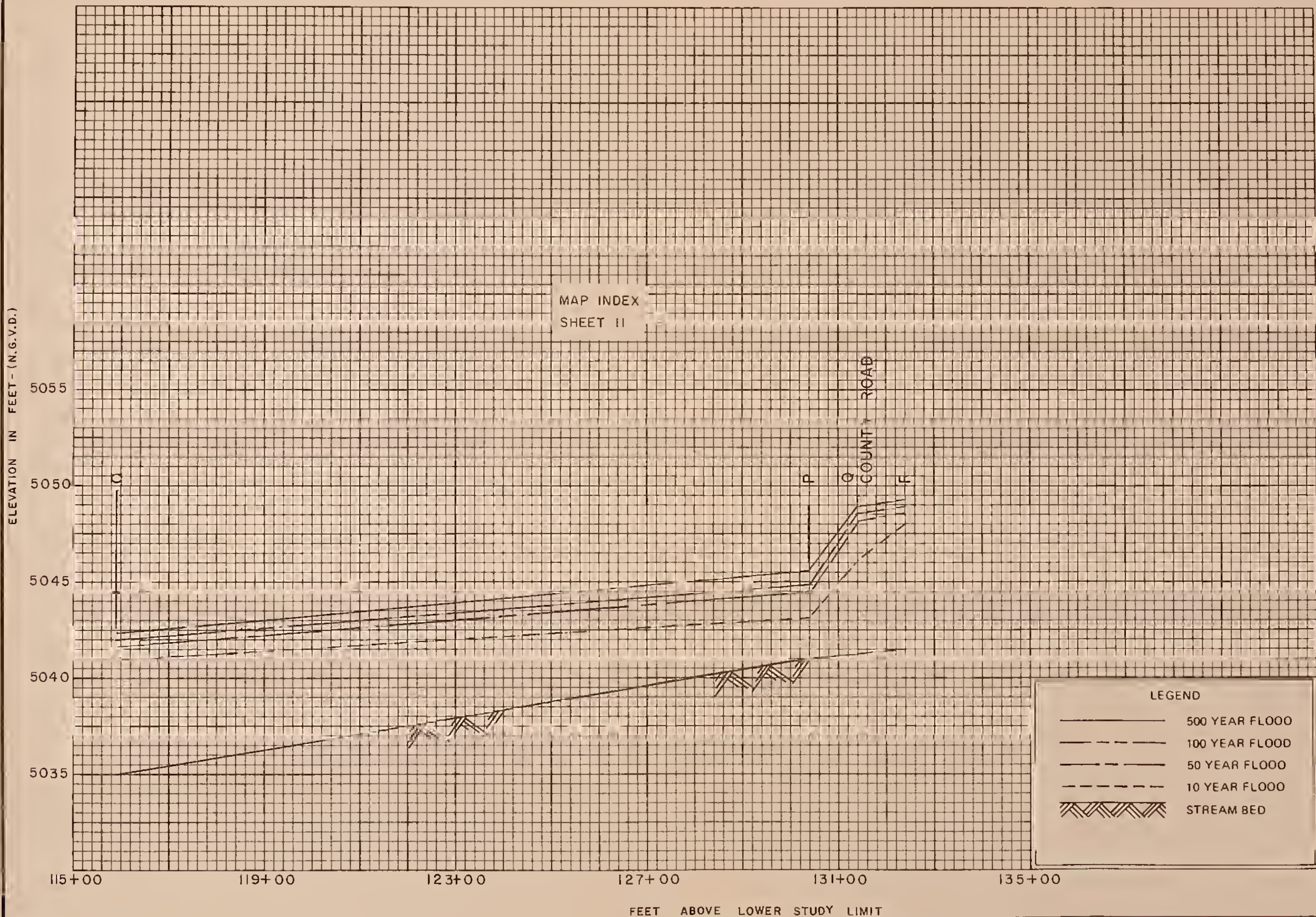


FLOOD PROFILES

BOX ELDER CREEK STUDY

REACH I- BOX ELDER CREEK
STA. 101+50 TO STA. 115+90

A-11



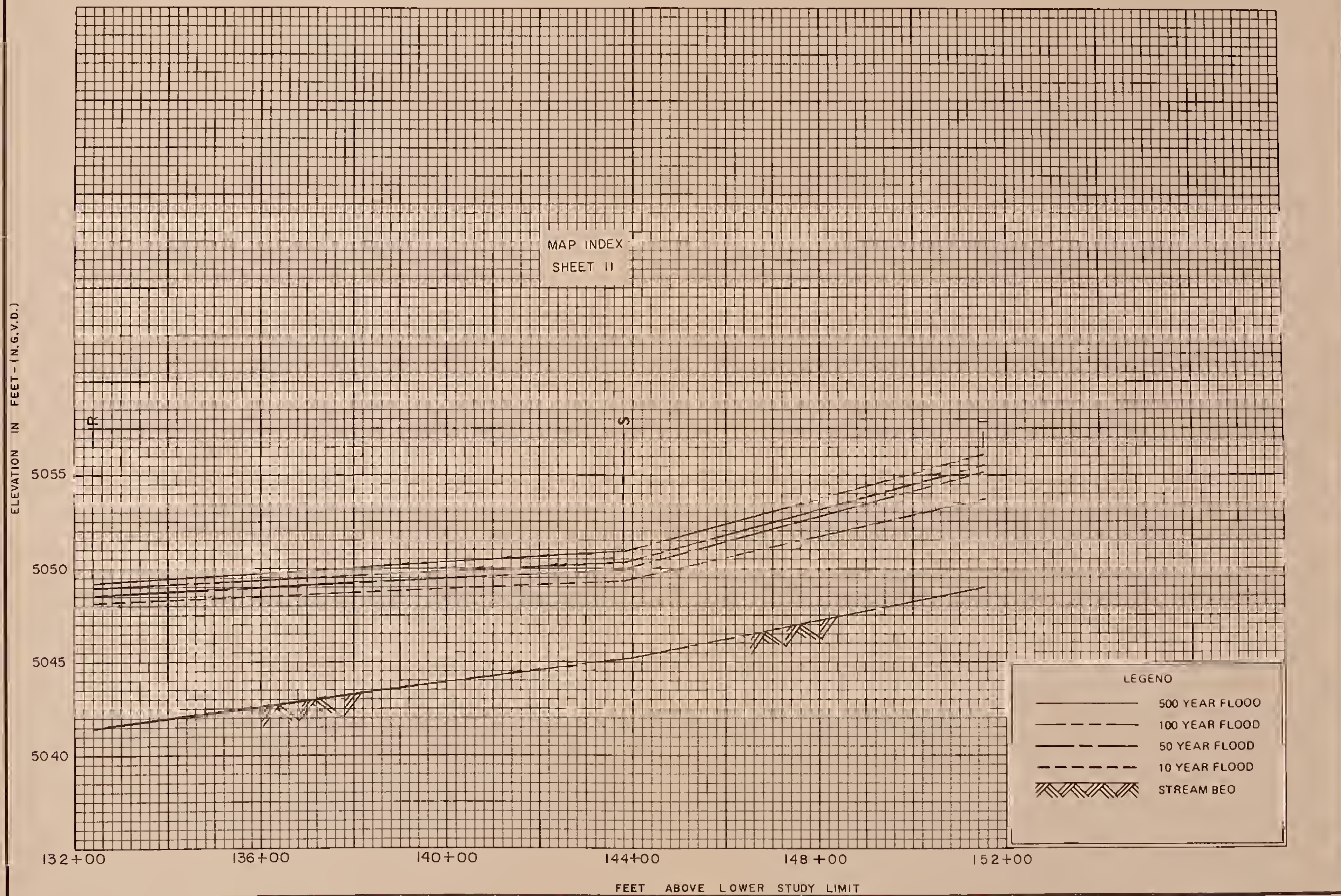
FLOOD PROFILES

BOX ELDER CREEK STUDY

REACH 1 - BOX ELDER CREEK
STA. 115+90 TO STA. 132+40

USDA-SCS

A-11



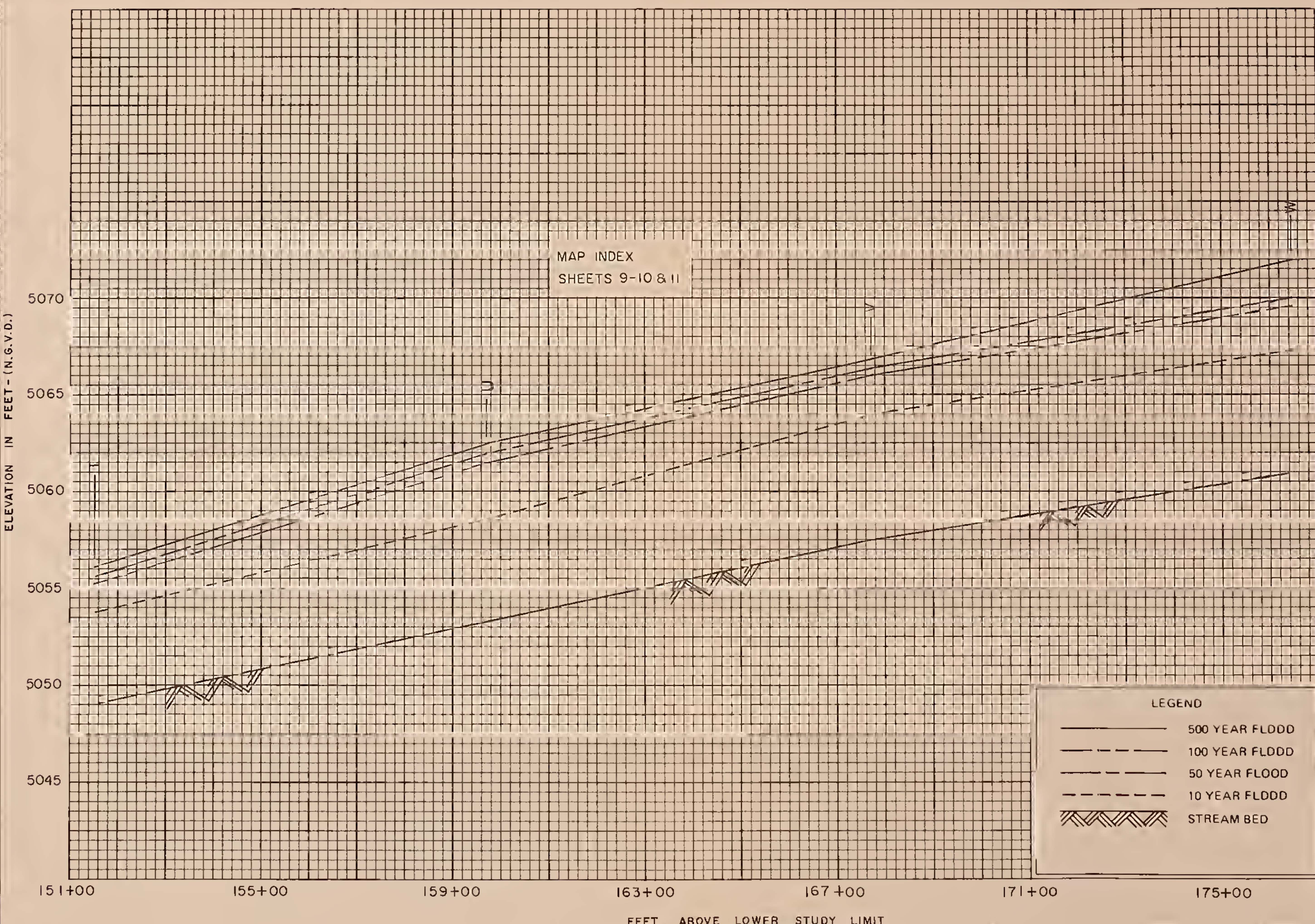
FLOOD PROFILES

BOX ELDER CREEK STUDY

REACH-I BOX ELDER CREEK
STA.132+00 TO STA.151+50

USDA-SCS

A-1k



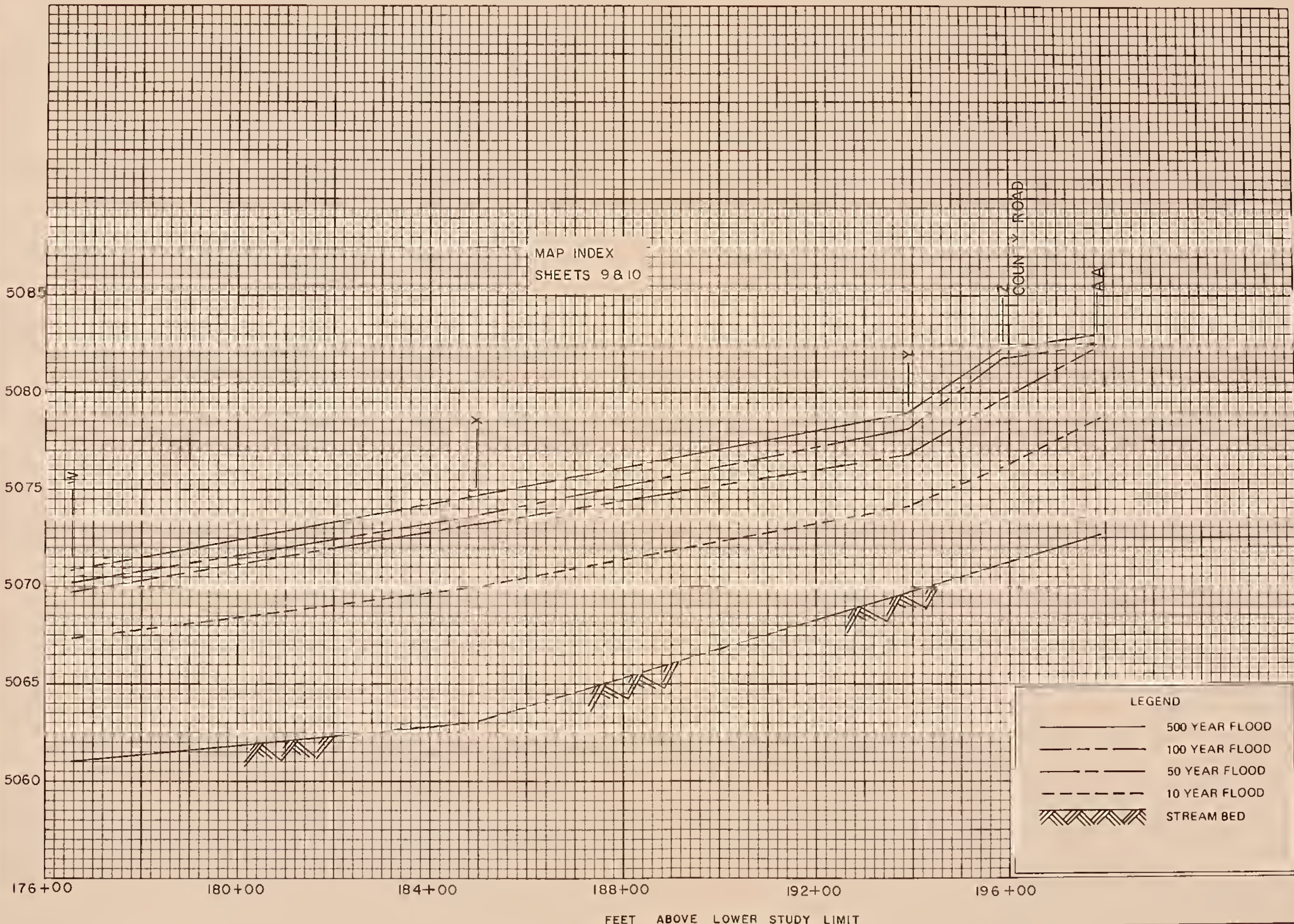
FLOOD PROFILES

BOX ELDER CREEK STUDY

REACH I - BOX ELDER CREEK
STA. 151+50 TO STA. 176+50

USDA-SCS

A-11



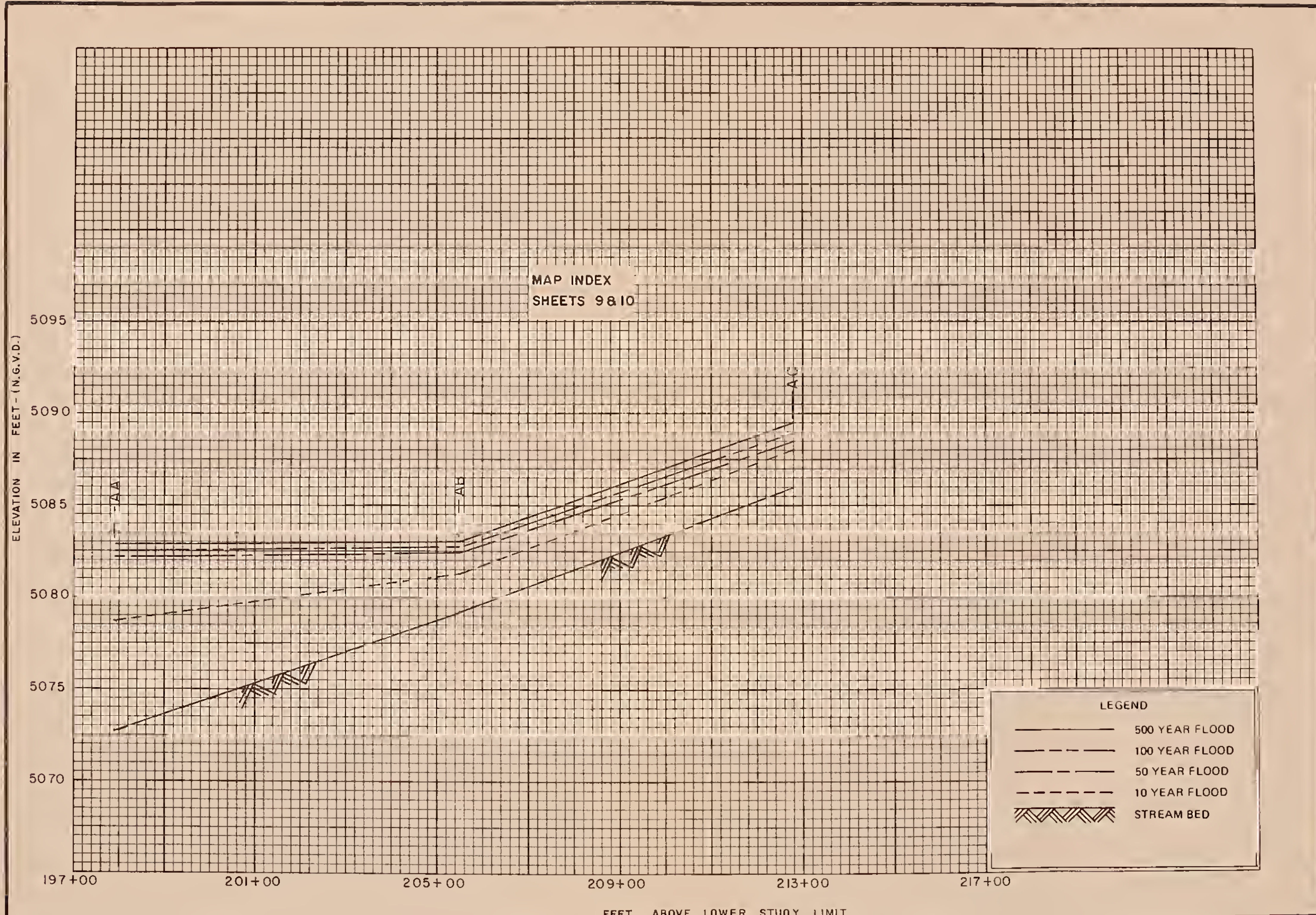
FLOOD PROFILES

BOX ELDER CREEK STUDY

REACH I - BOX ELDER CREEK
STA. 176+50 TO STA. 197+90

USDA-SCS

A-Im



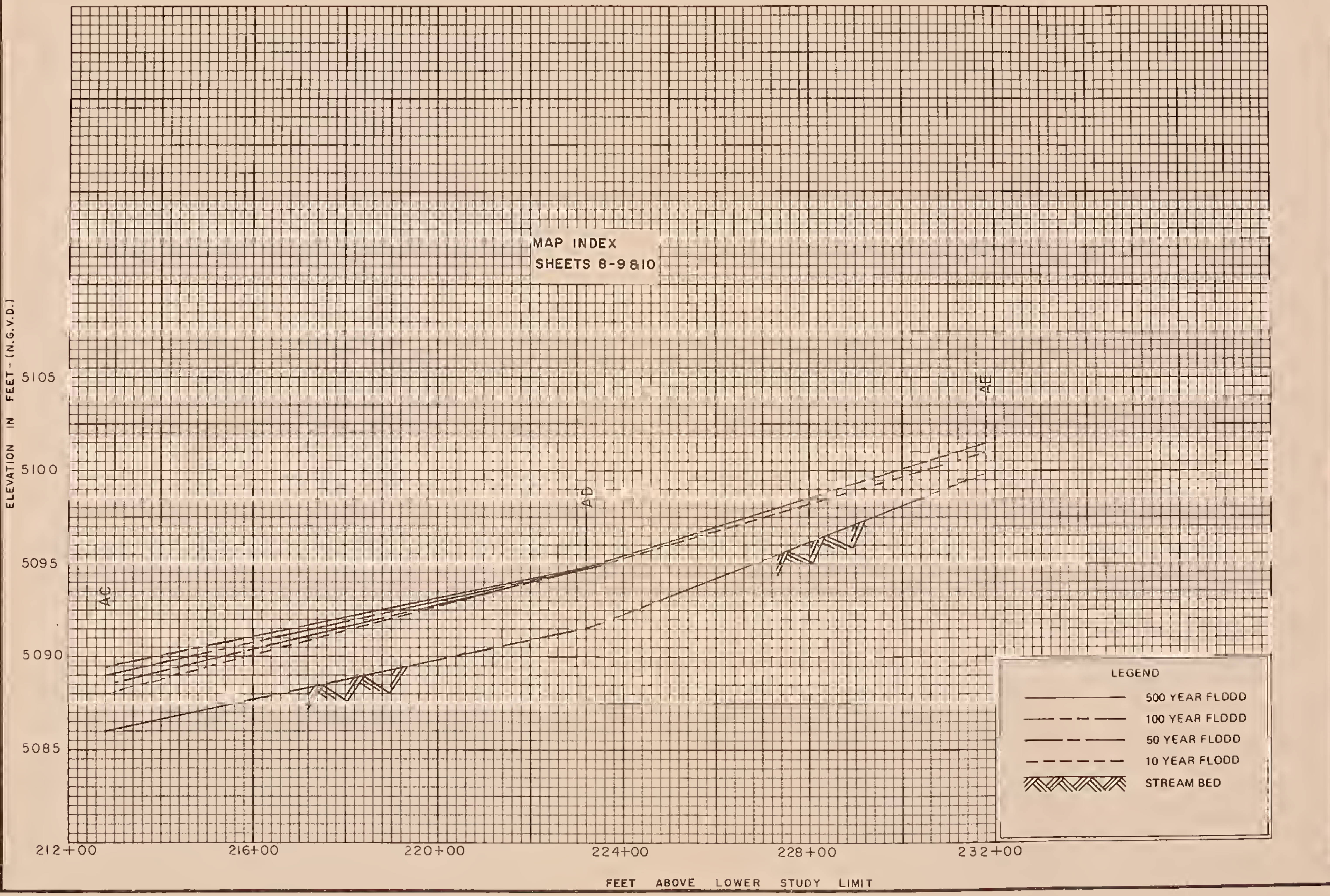
FLOOD PROFILES

BOX ELDER CREEK STUDY

REACH I - BOX ELDER CREEK
STA. 197+90 TO STA. 212+80

USDA - SCS

A-1n

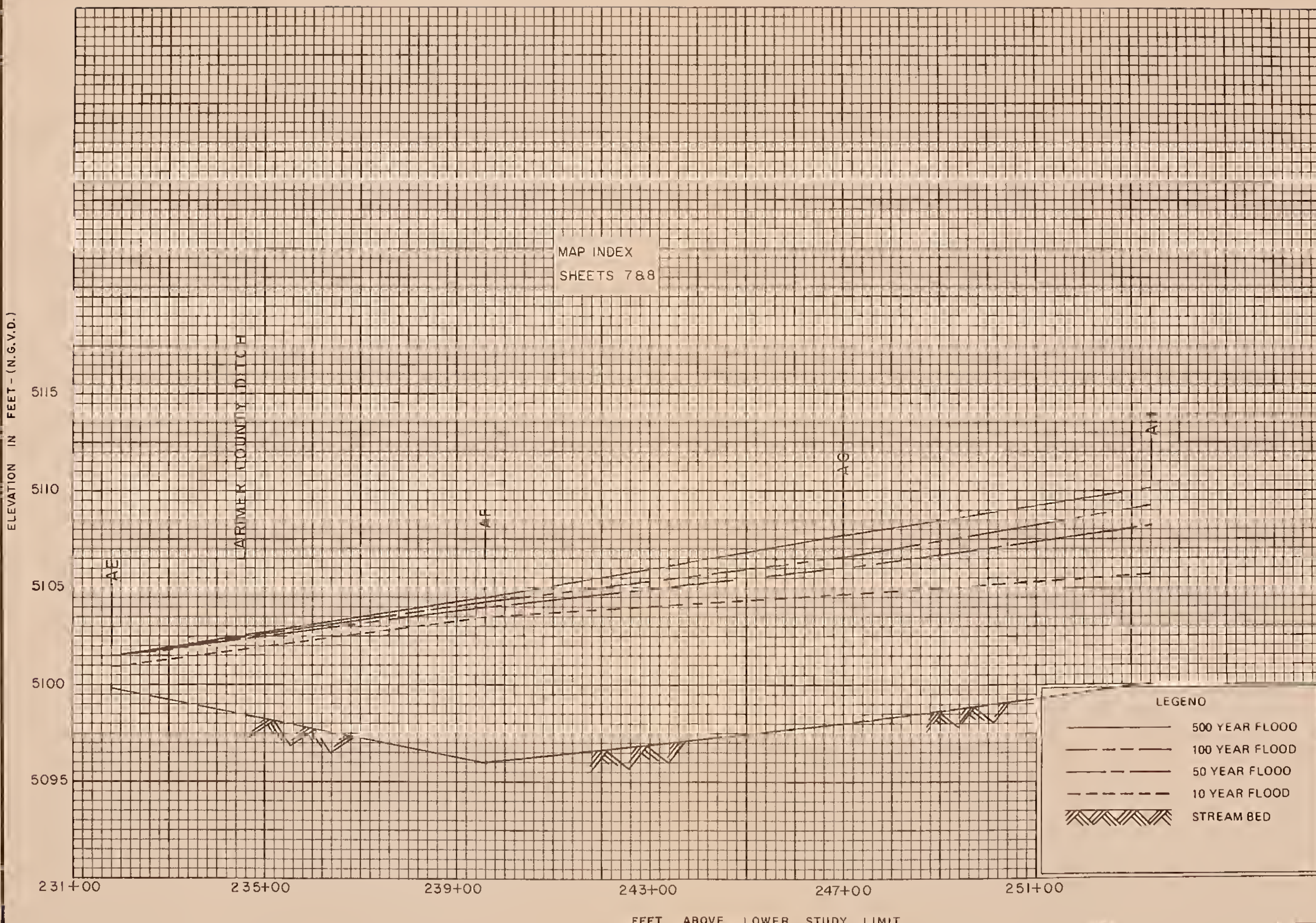


FLOOD PROFILES

BOX ELDER CREEK STUDY

REACH I - BOX ELDER CREEK
STA. 212+80 TO STA. 231+85
USDA-SCS

A-10

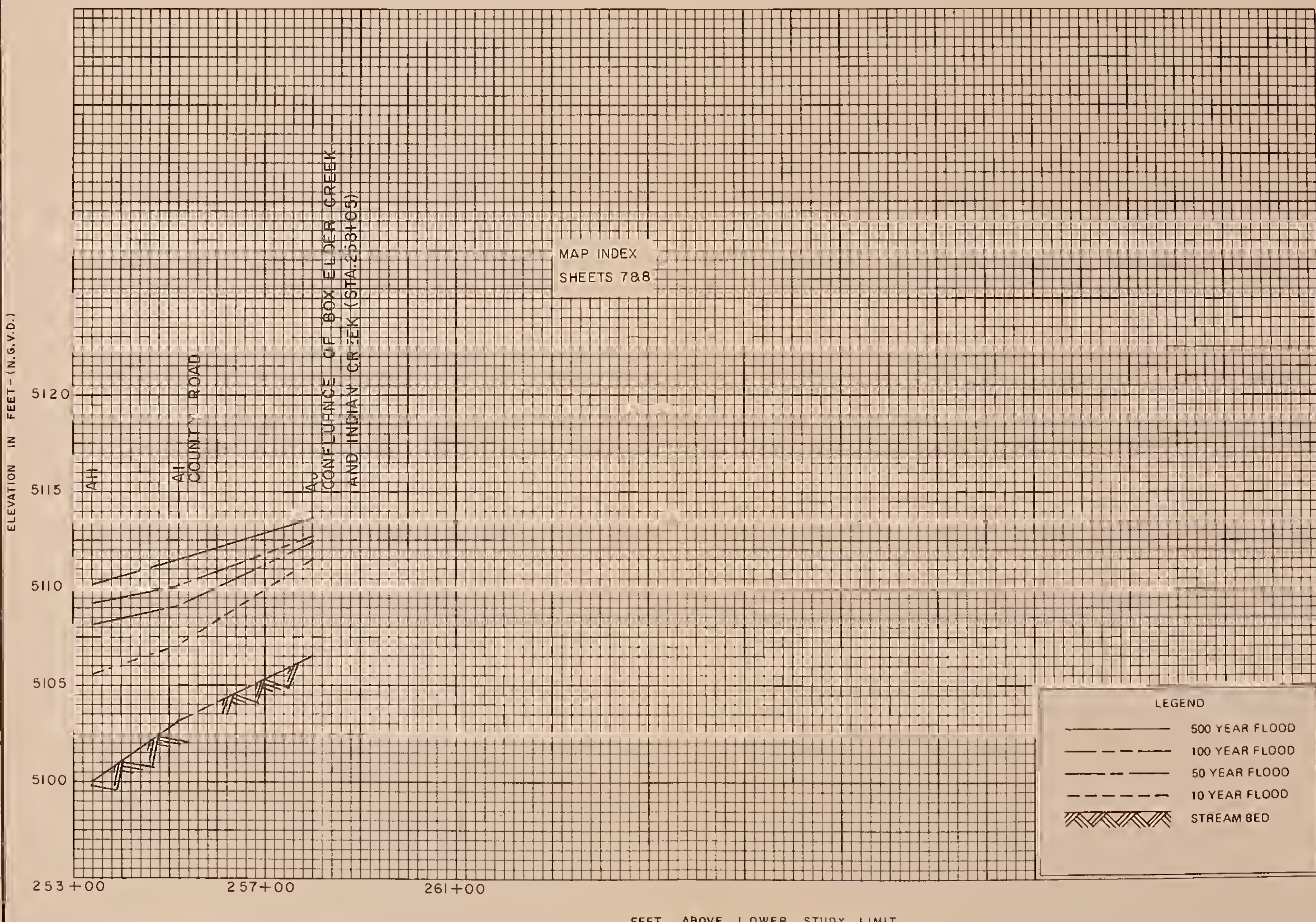


FLOOD PROFILES

BOX ELDER CREEK STUDY

REACH I - BOX ELDER CREEK
STA. 231+85 TO STA. 253+45

A- Ip

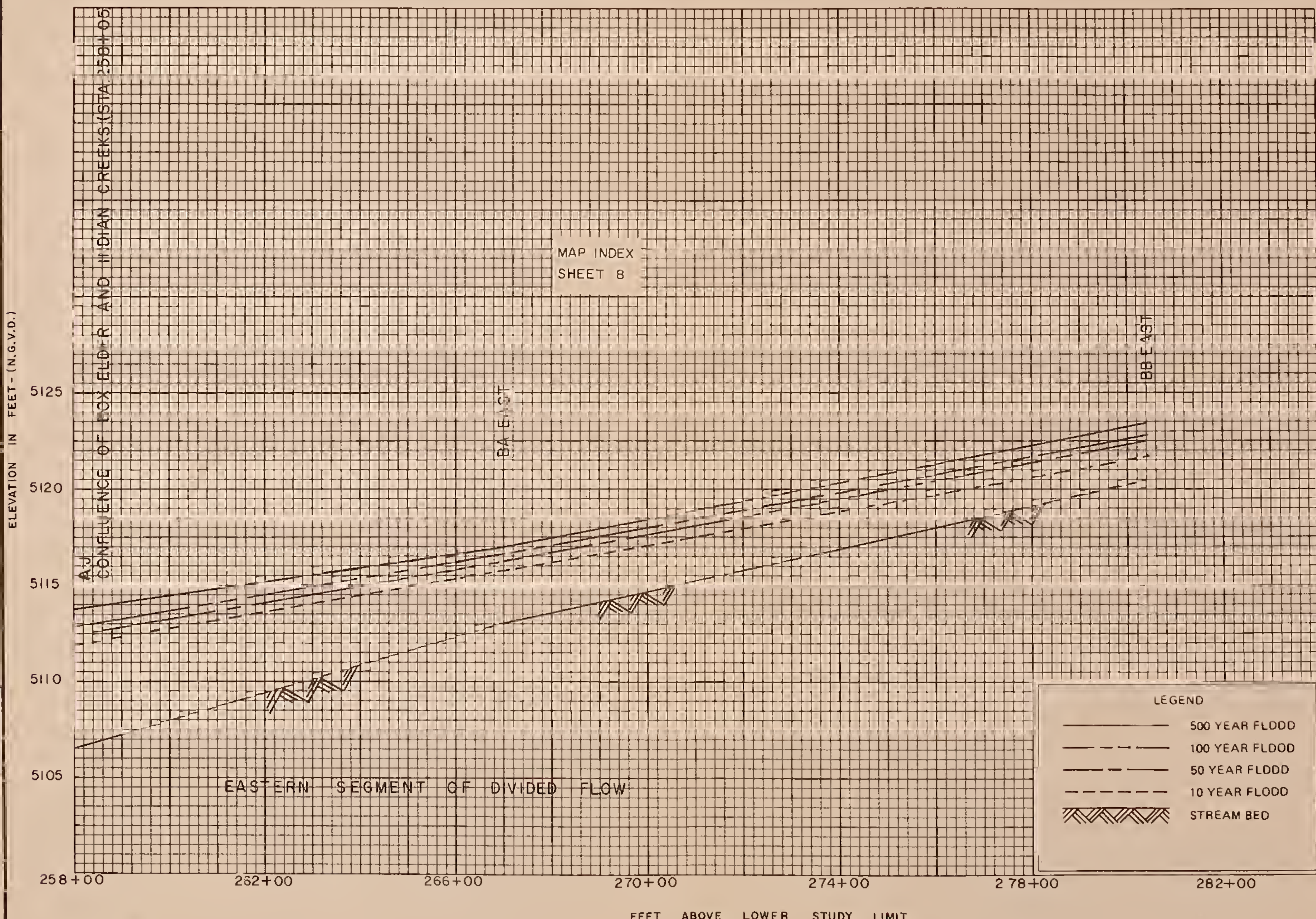


FLOOD PROFILES

BOX ELDER CREEK STUDY

REACH 1 - BOX ELDER CREEK
STA. 253+45 TO STA. 258+05

USDA - SCS



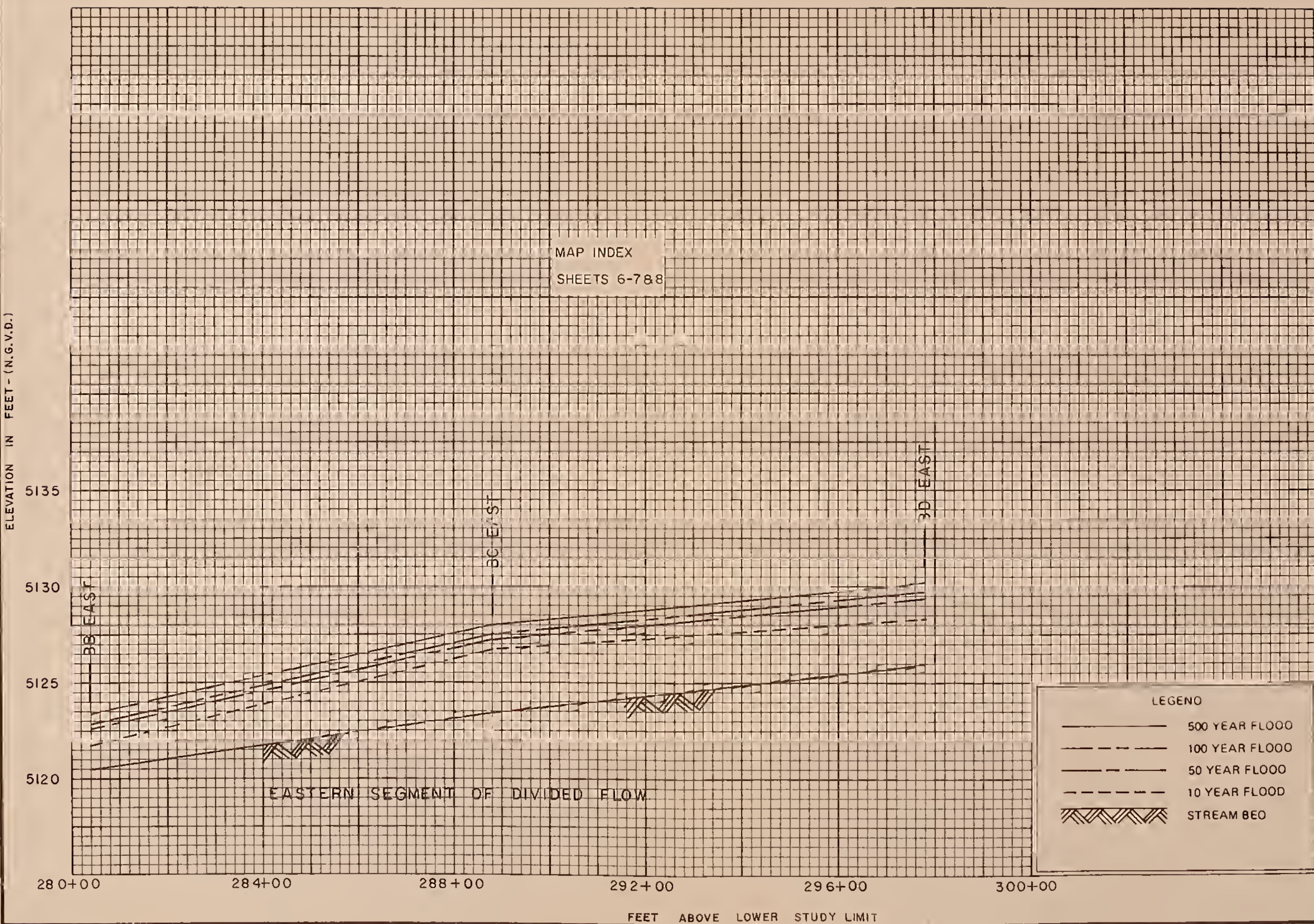
FLOOD PROFILES

BOX ELDER CREEK STUDY

REACH 2 - BOX ELDER CREEK
STA. 258+05 TO STA. 280+45

USDA-SCS

A-2



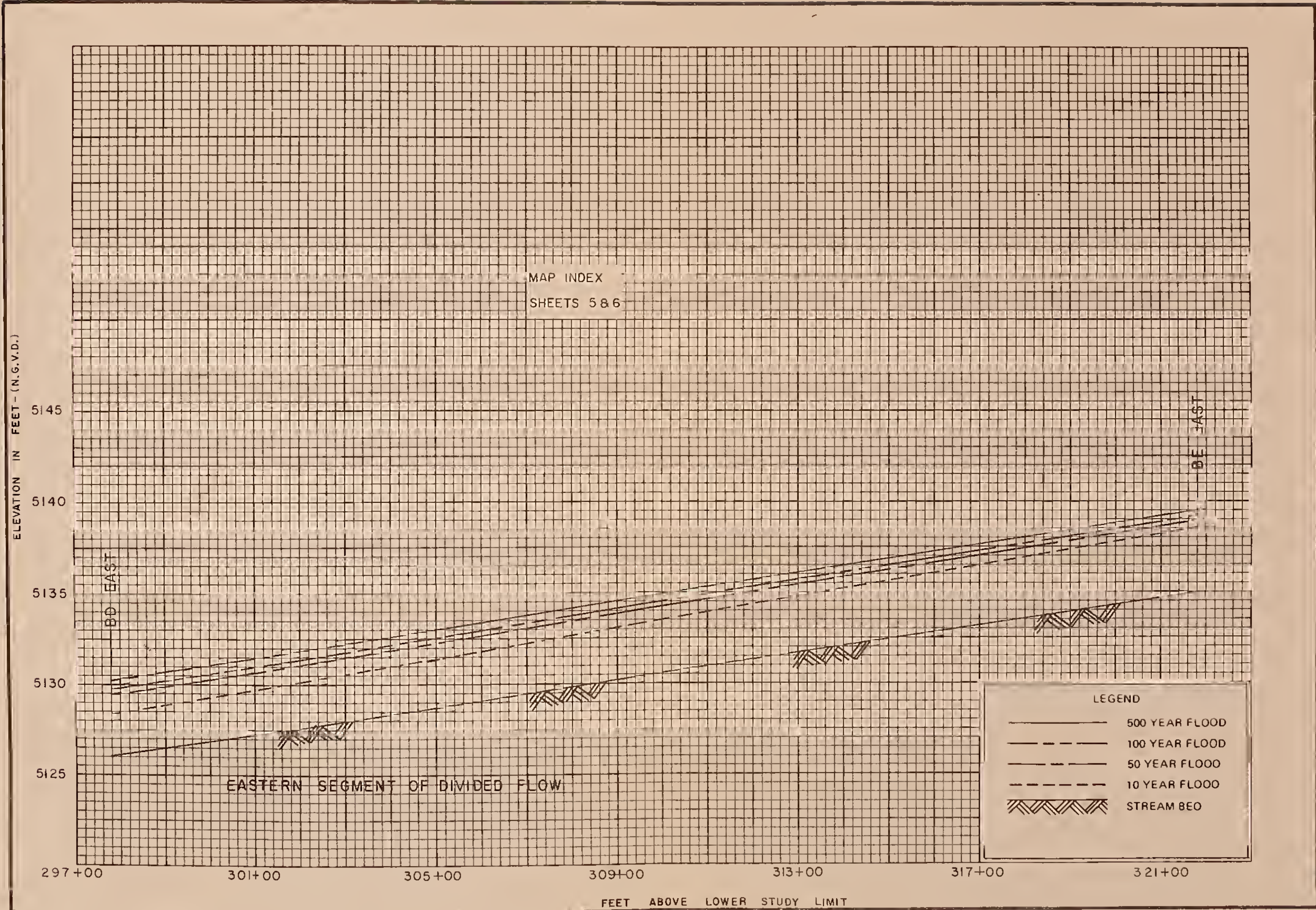
FLOOD PROFILES

BOX ELDER CREEK STUDY

REACH 2 - BOX ELDER CREEK
STA.280+45 TO STA.297+75

USDA-SCS

A-2a



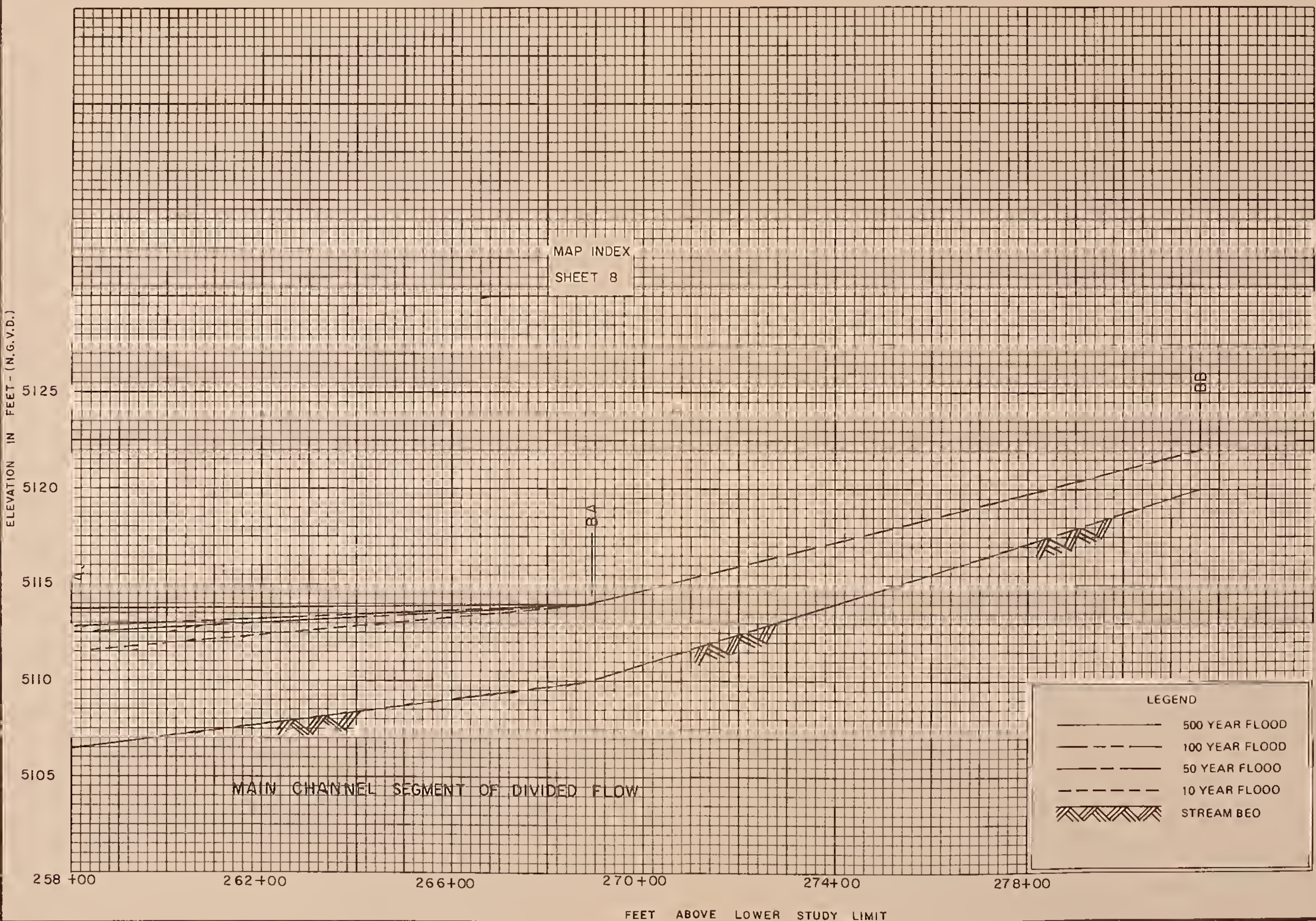
FLOOD PROFILES

BOX ELDER CREEK STUDY

REACH 2 - BOX ELDER CREEK
STA. 297+75 TO STA. 321+75

USDA - SCS

A - 2b



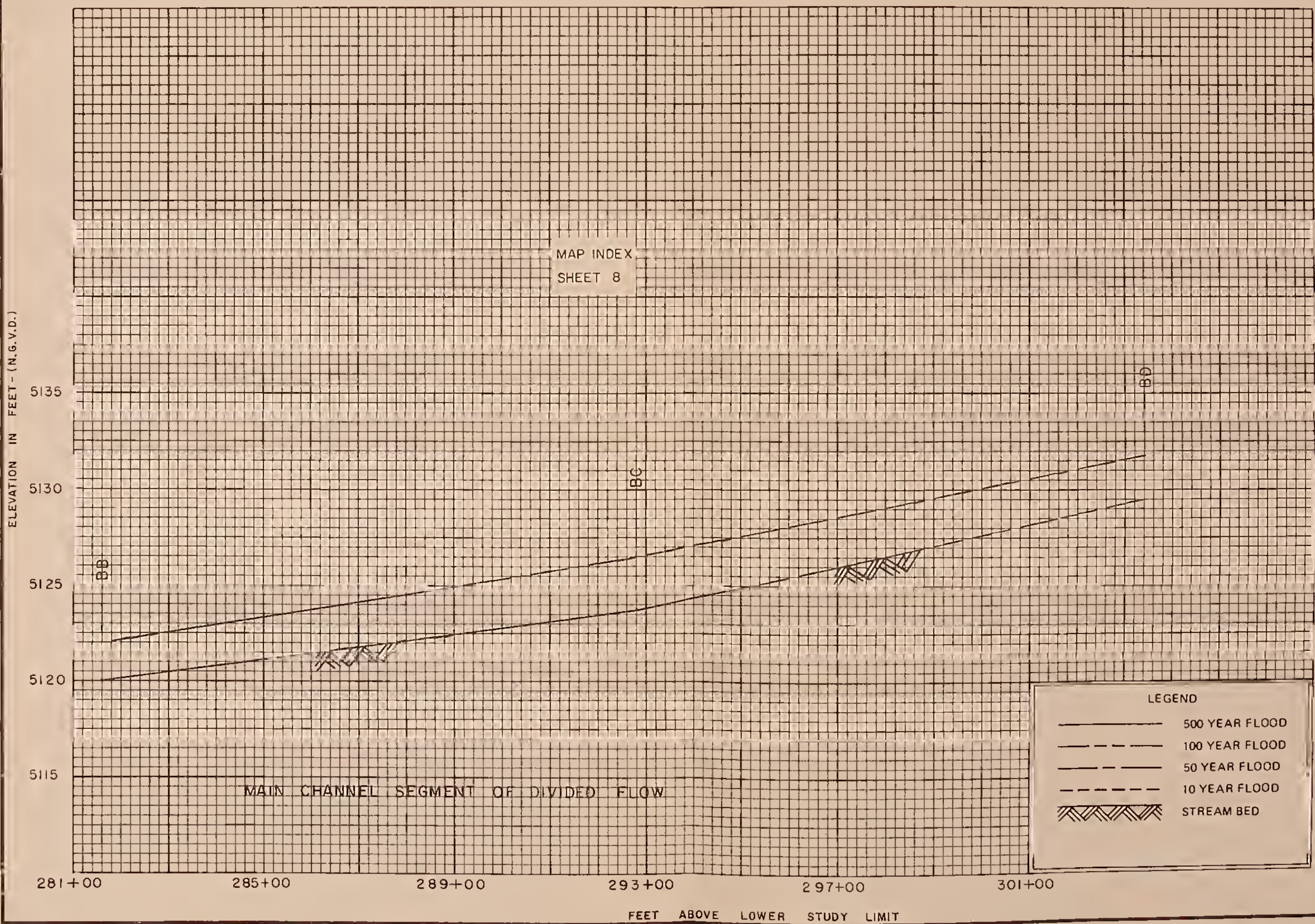
FLOOD PROFILES

BOX ELDER CREEK STUDY

REACH 2- BOX ELDER CREEK
STA.258+05 TO STA.281+65

USDA-SCS

A-2c



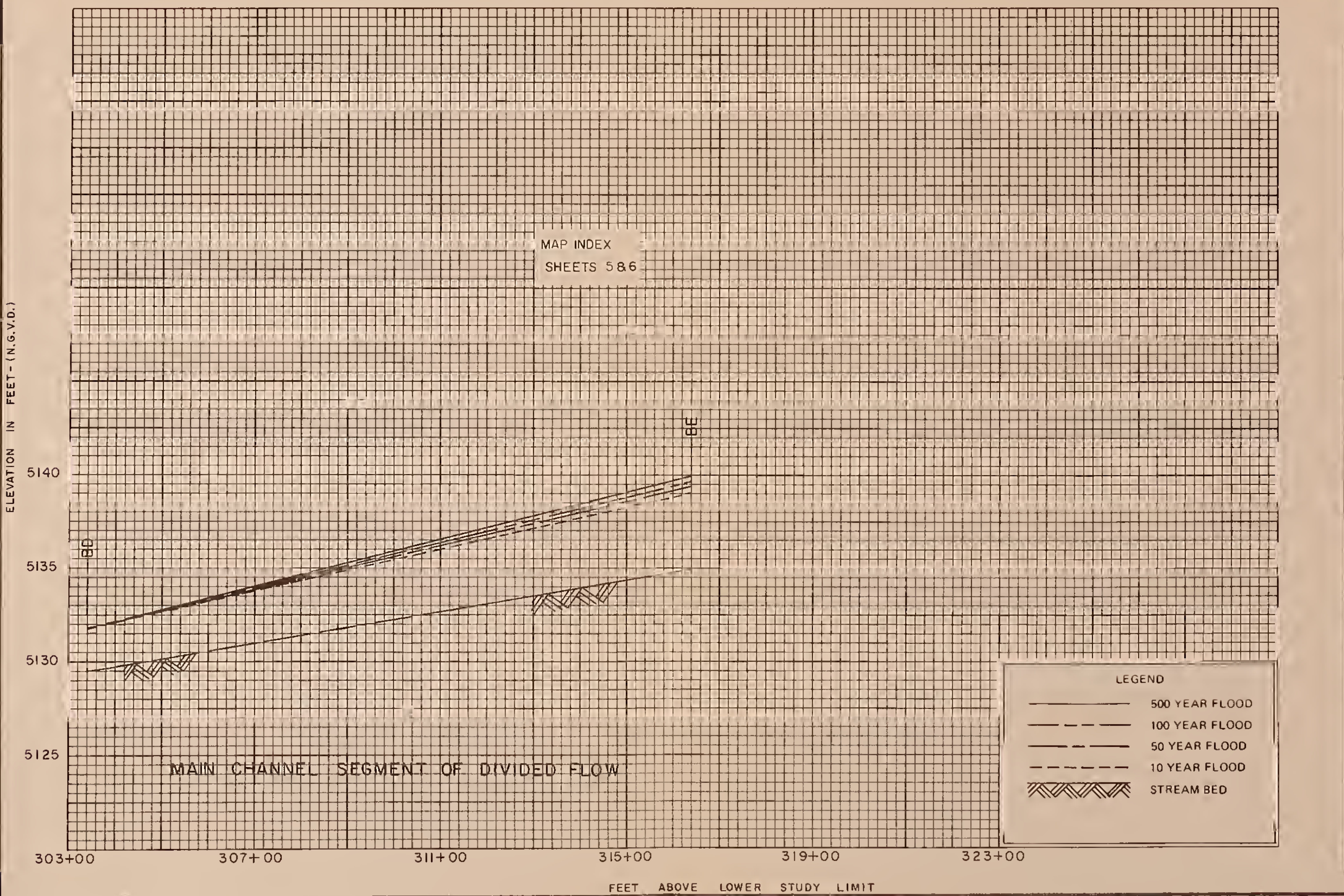
FLOOD PROFILES

BOX ELDER CREEK STUDY

REACH 2 - BOX ELDER CREEK
STA. 281+65 TO STA. 303+35

USDA - SCS

A-2d



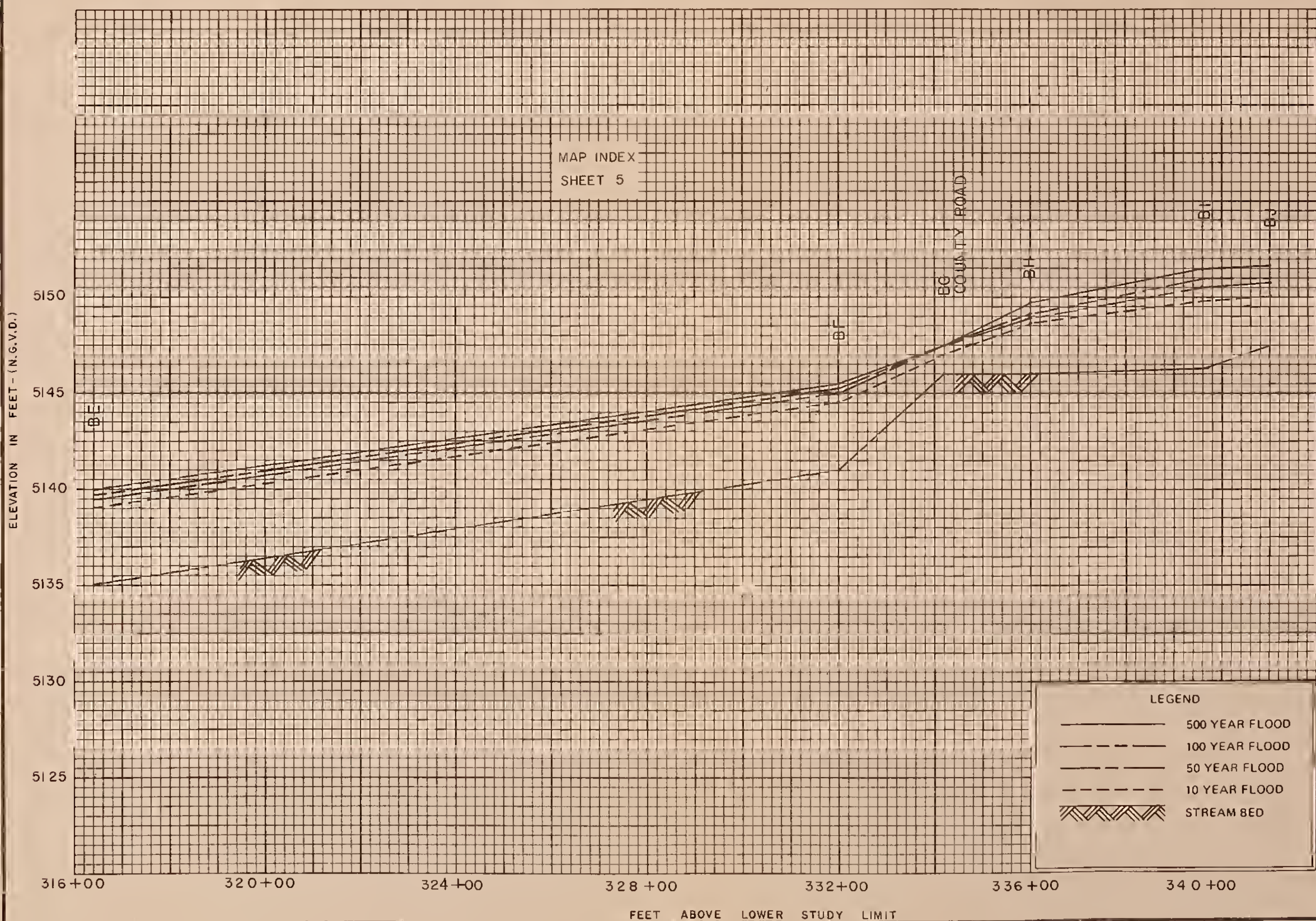
FLOOD PROFILES

BOX ELDER CREEK STUDY

REACH 2 - BOX ELDER CREEK
STA. 303+35 TO STA. 316+35

USDA-SCS

A-2e



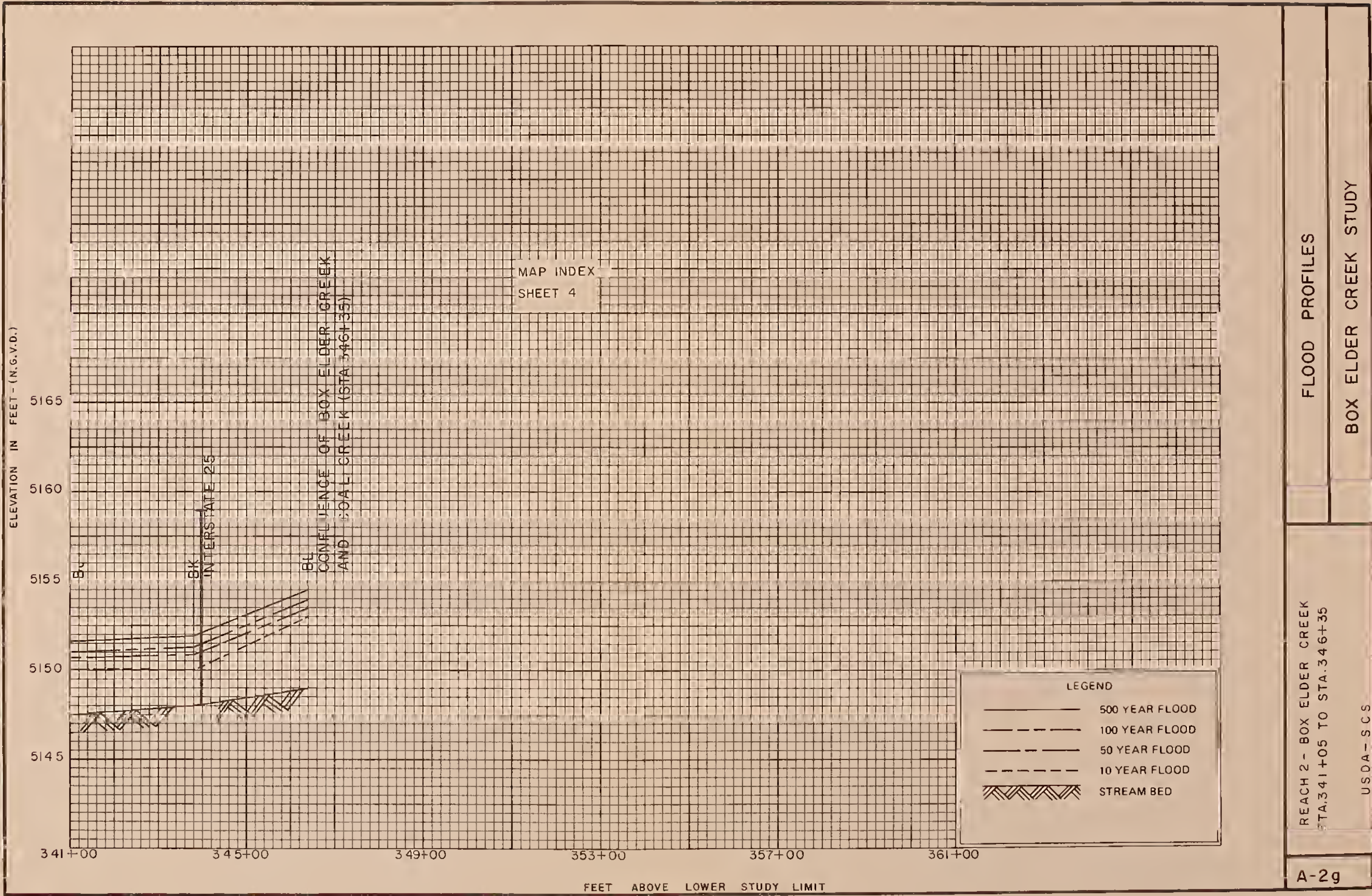
FLOOD PROFILES

BOX ELDER CREEK STUDY

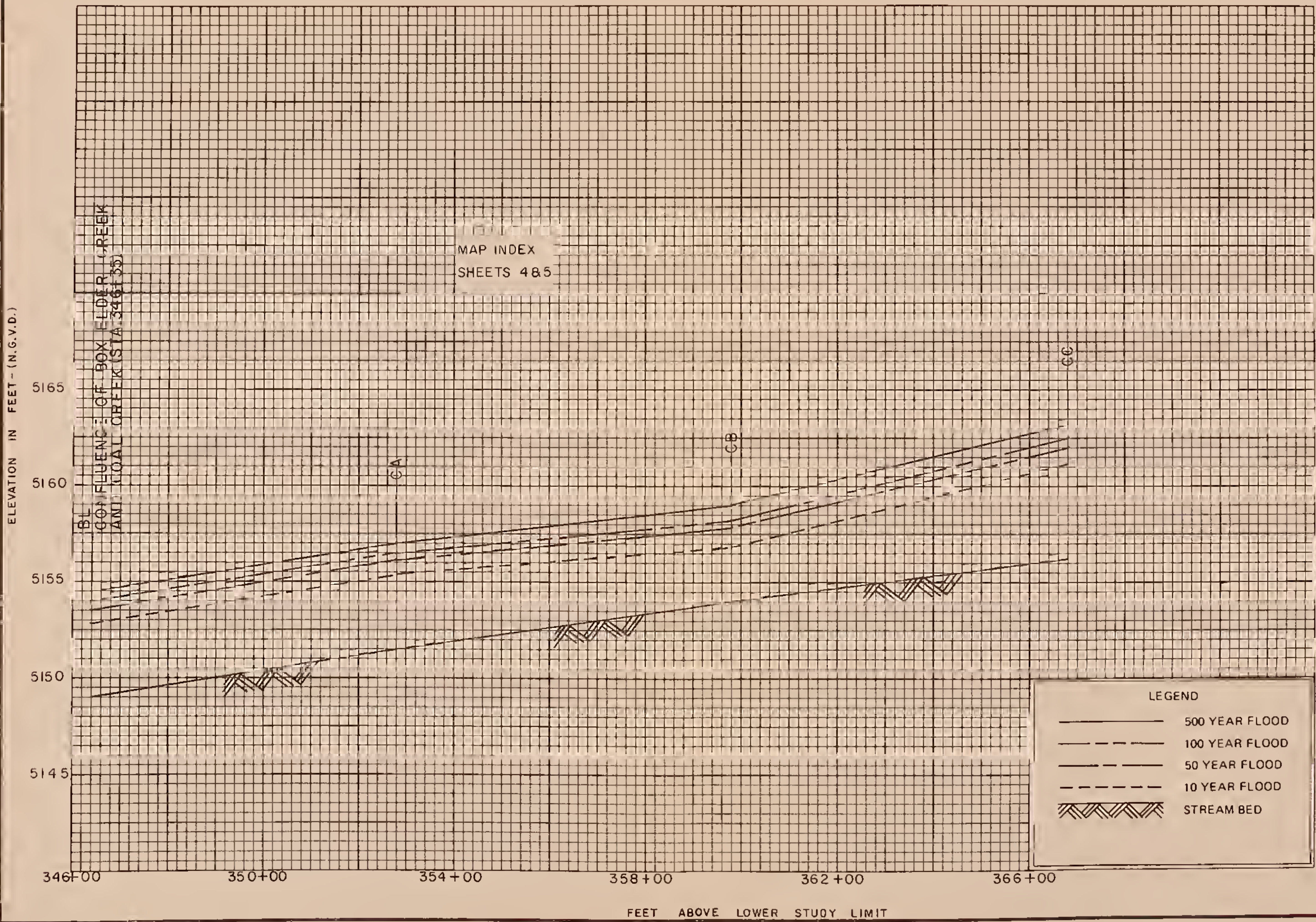
REACH 2 - BOX ELDER CREEK
STA. 316+35 TO STA. 341+05

USDA-SCS

A-2f



MAP INDEX
SHEET 4
BJ
BK
INTERSTATE 25
BL
CONFLUENCE OF BOX ELDER CREEK
AND COAL CREEK (STA 346+35)
ELEVATION IN FEET - (N.G.V.D.)
5145
5150
5155
5160
5165
341+00
345+00
349+00
353+00
357+00
361+00
FEET ABOVE LOWER STUDY LIMIT
LEGEND
500 YEAR FLOOD
100 YEAR FLOOD
50 YEAR FLOOD
10 YEAR FLOOD
STREAM BED
FLOOD PROFILES
BOX ELDER CREEK STUDY
REACH 2 - BOX ELDER CREEK
STA.341+05 TO STA.346+35
USDA - SCS
A-2g



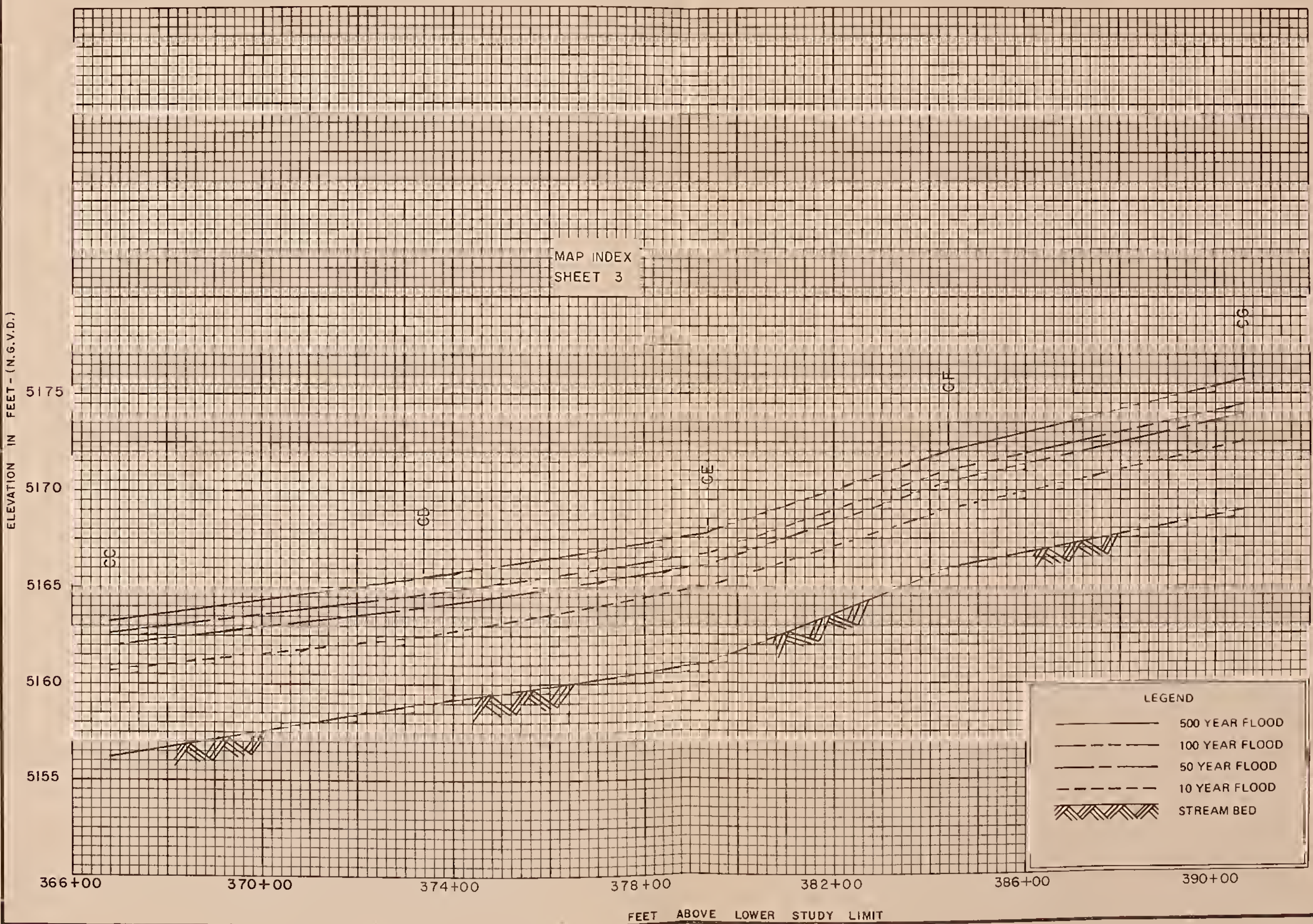
FLOOD PROFILES

BOX ELDER CREEK STUDY

REACH 3 - BOX ELDER CREEK
STA. 346+35 TO STA. 366+85

USDA - SCS

A-3



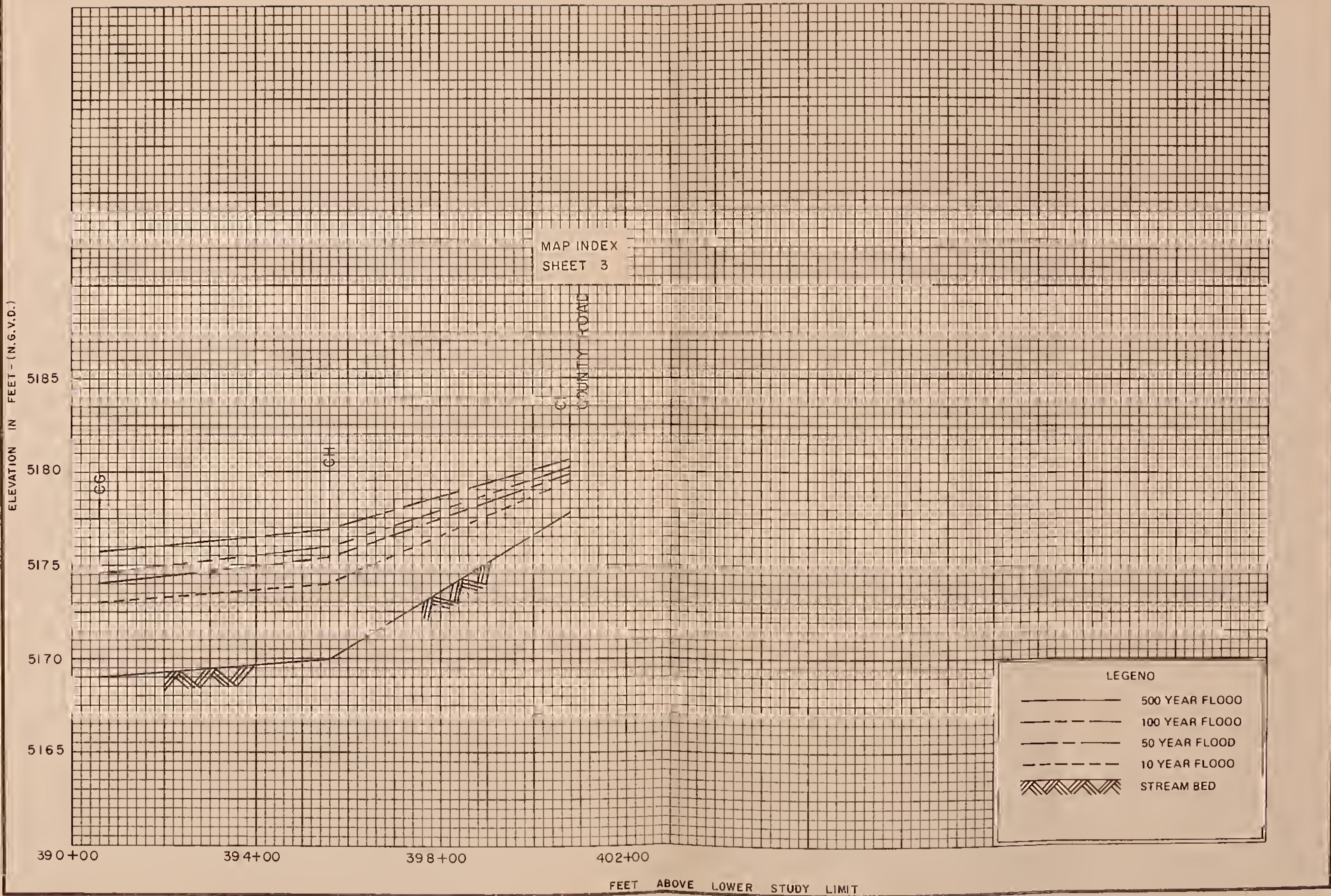
FLOOD PROFILES

BOX ELDER CREEK STUDY

REACH 3 - BOX ELDER CREEK
STA. 366+85 TO STA. 390+55

USDA - SCS

A-3a



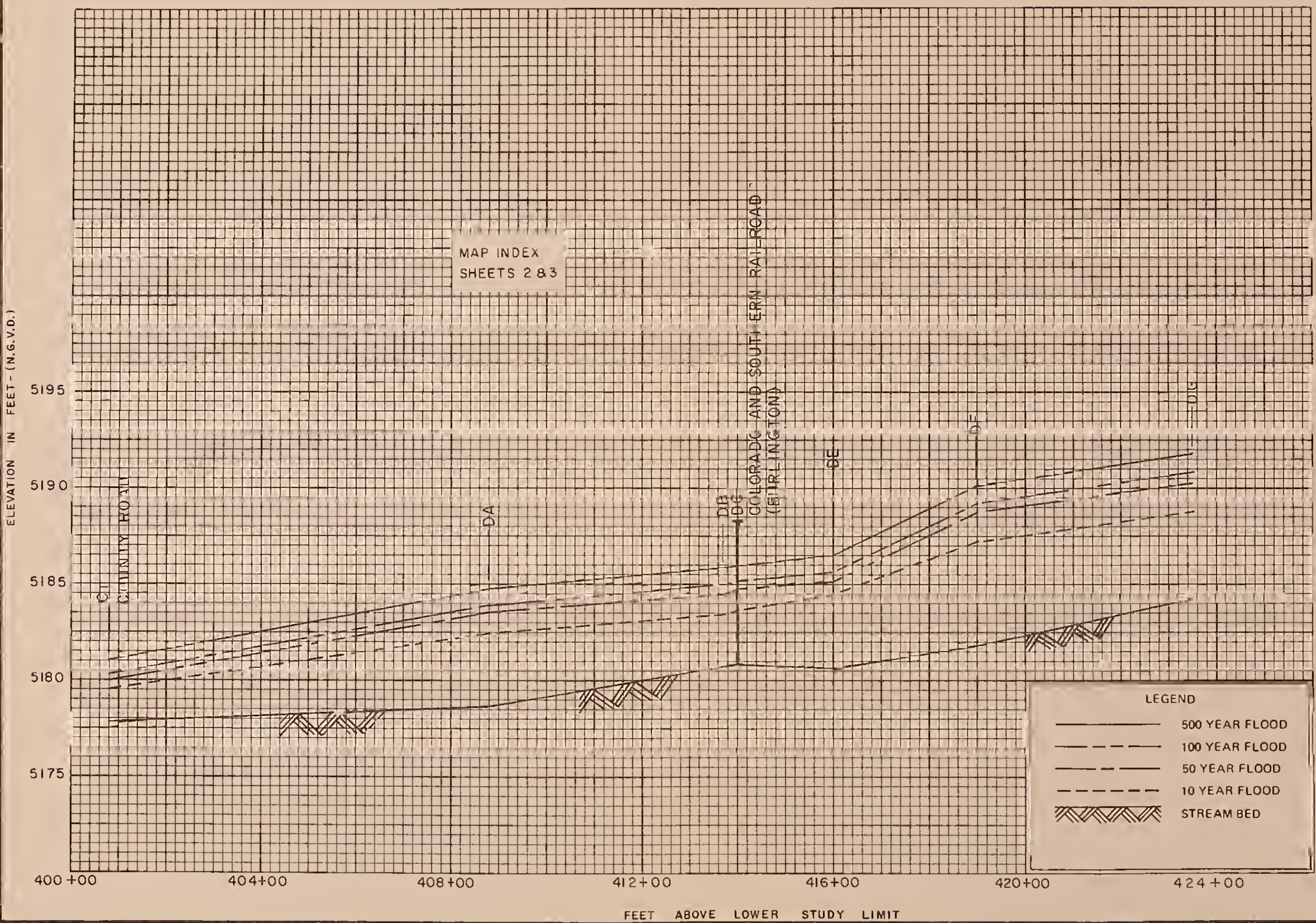
FLOOD PROFILES

BOX ELDER CREEK STUDY

REACH 3 - BOX ELDER CREEK
STA. 390+55 TO STA. 400+85

USDA-SCS

A-3b



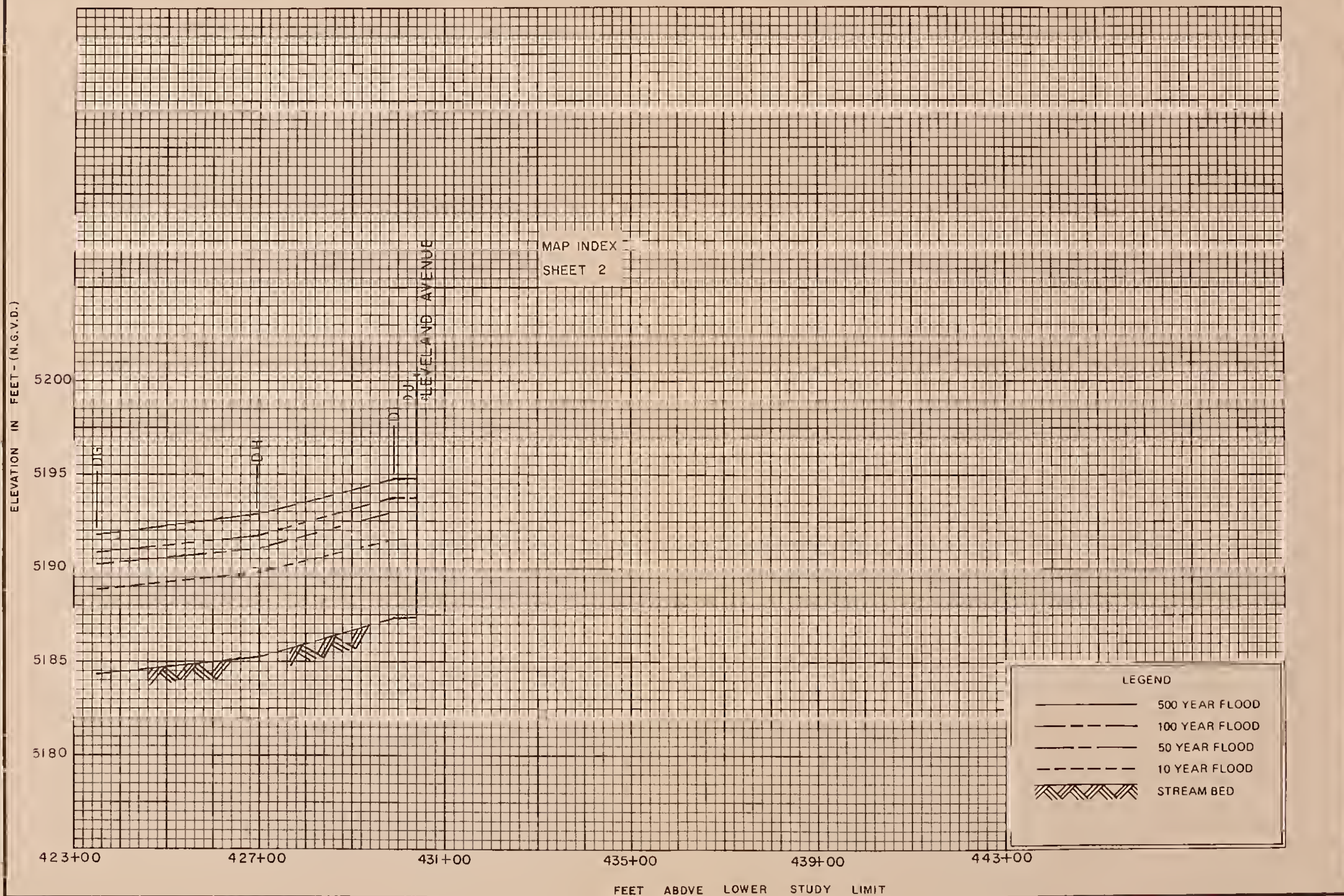
FLOOD PROFILES

BOX ELDER CREEK STUDY

REACH 4-BOX ELDER CREEK
STA. 400+85 TO STA. 423+50

USDA-SCS

A-4



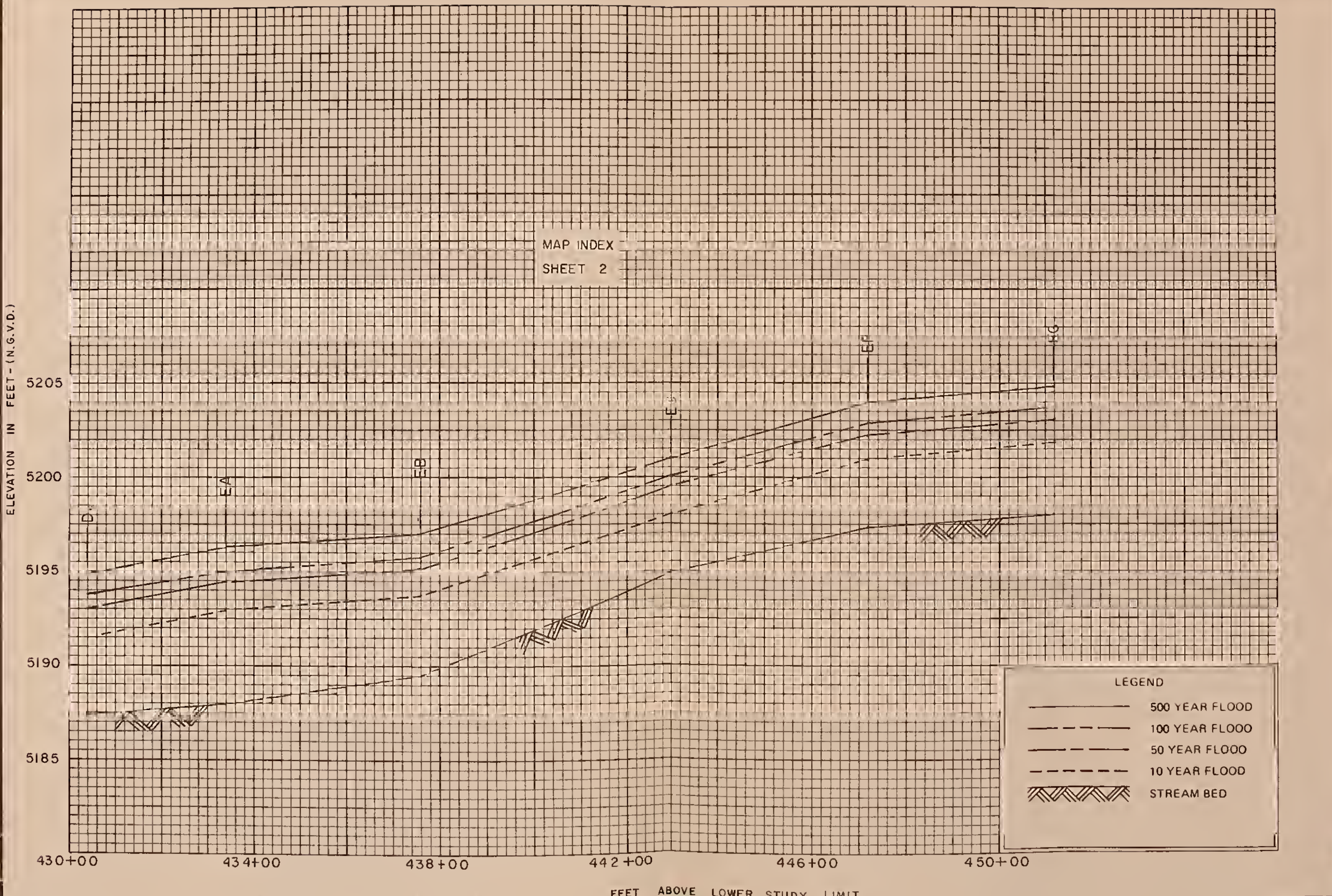
FLOOD PROFILES

BOX ELDER CREEK STUDY

REACH 4 - BOX ELDER CREEK
STA. 423+50 TO STA. 430+40

USDA-SCS

A-4a



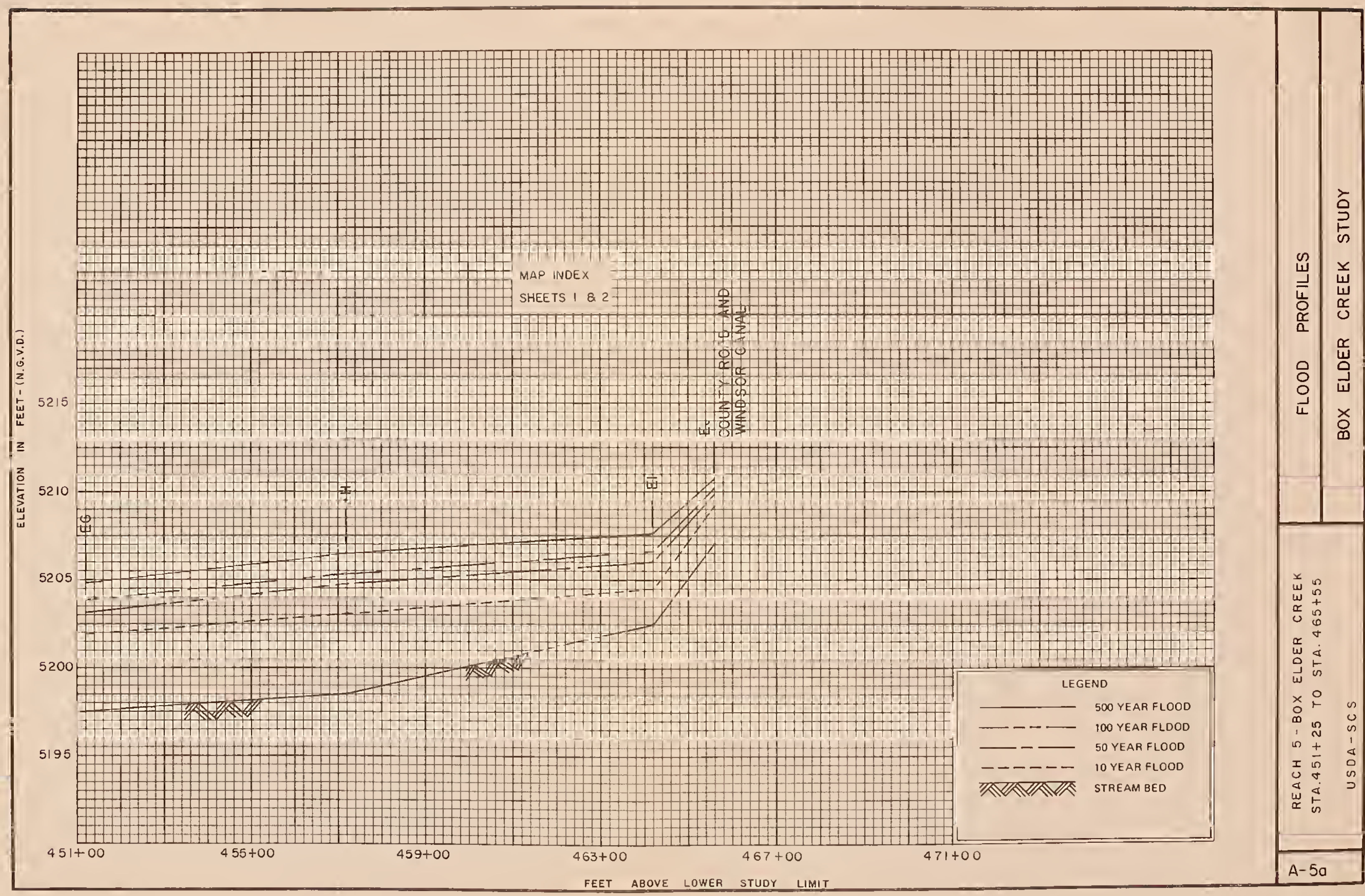
FLOOD PROFILES

BOX ELDER CREEK STUDY

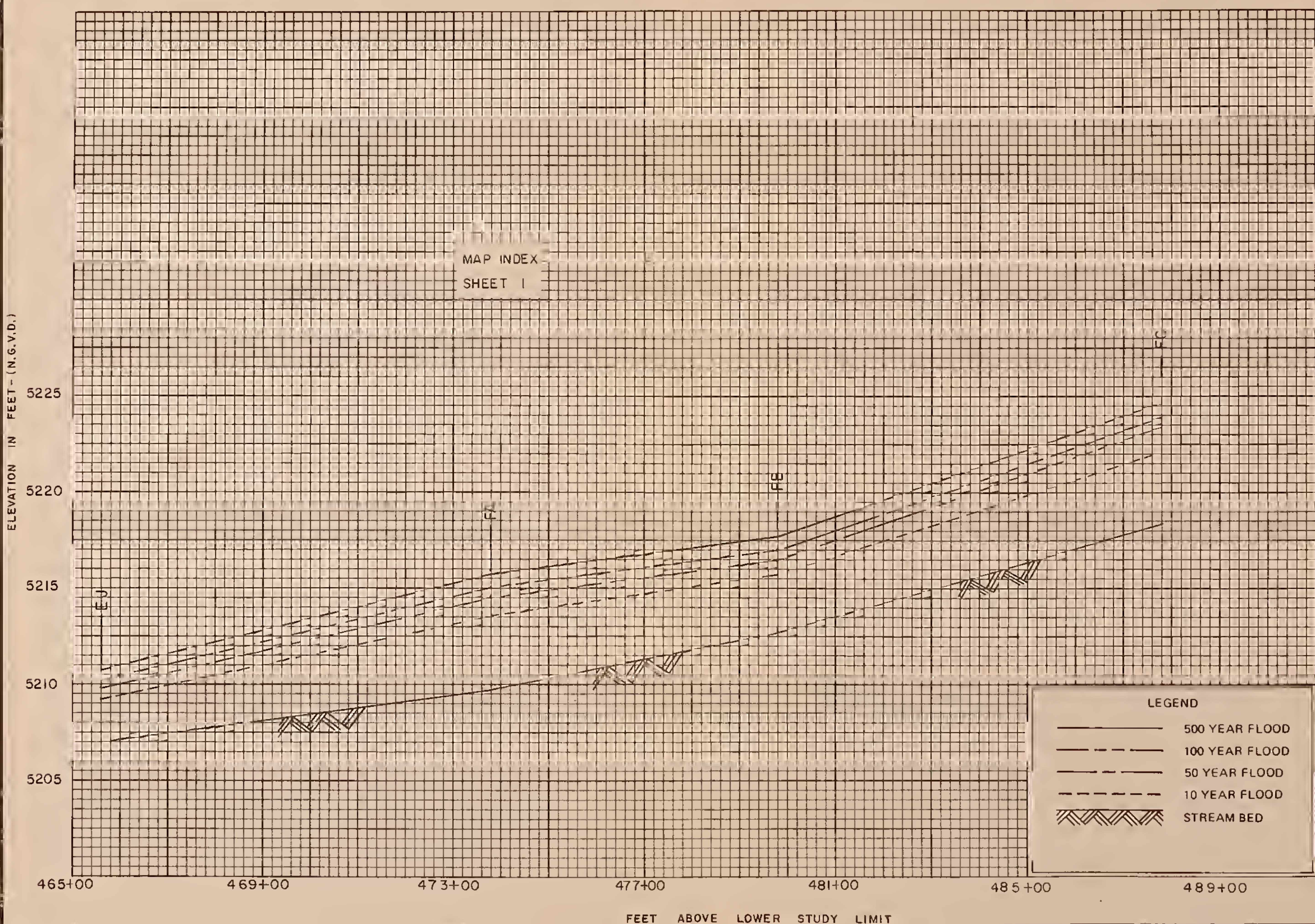
REACH 5 - BOX ELDER CREEK
STA. 430+40 TO STA. 451+25

USDA-SCS

A-5



MAP INDEX
SHEETS 1 & 2
COUNTY ROAD AND
WINDSOR CANAL
EG
EH
EI
EJ
5215
5210
5205
5200
5195
ELEVATION IN FEET - (N.G.V.D.)
451+00
455+00
459+00
463+00
467+00
471+00
FEET ABOVE LOWER STUDY LIMIT
LEGEND
500 YEAR FLOOD
100 YEAR FLOOD
50 YEAR FLOOD
10 YEAR FLOOD
STREAM BED
FLOOD PROFILES
BOX ELDER CREEK STUDY
REACH 5 - BOX ELDER CREEK
STA. 451+25 TO STA. 465+55
USDA-SCS
A-5a



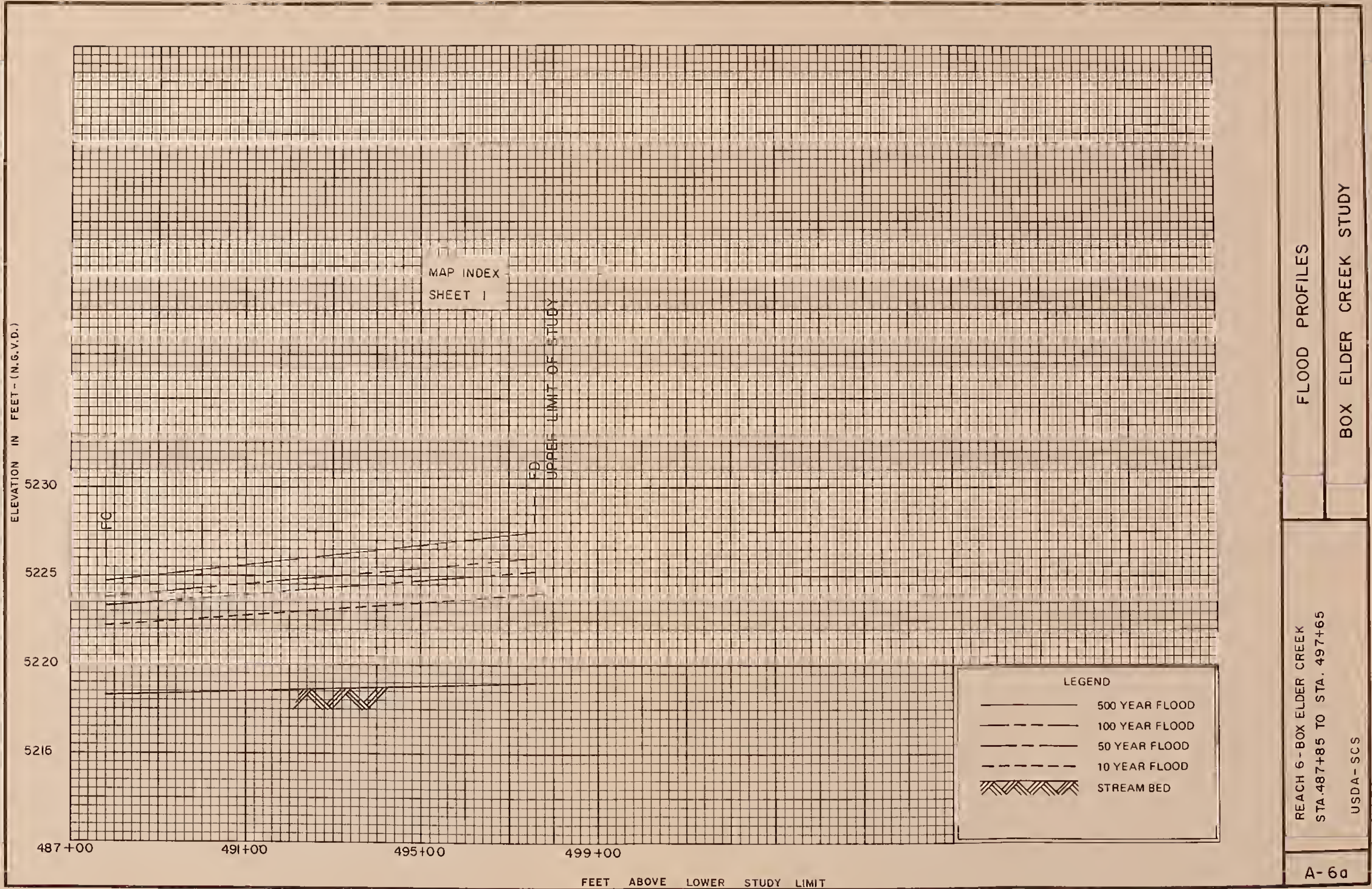
FLOOD PROFILES

BOX ELDER CREEK STUDY

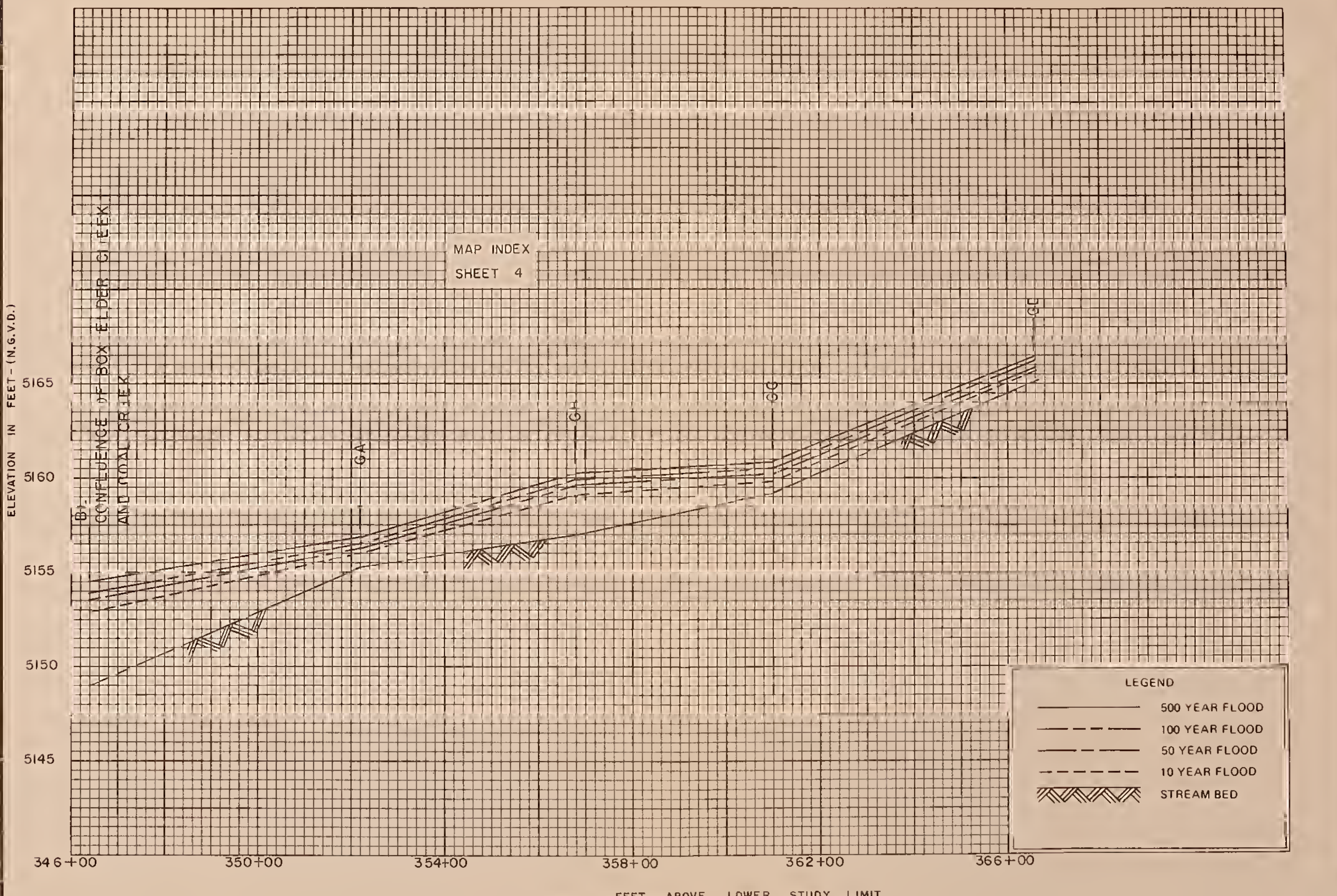
REACH 6 - BOX ELDER CREEK
STA. 465+55 TO STA. 487+85

USDA - SCS

A- 6



MAP INDEX
SHEET 1
UPPER LIMIT OF STUDY
FC
FD
ELEVATION IN FEET - (N.G.V.D.)
5230
5225
5220
5216
487+00
491+00
495+00
499+00
FEET ABOVE LOWER STUDY LIMIT
LEGEND
500 YEAR FLOOD
100 YEAR FLOOD
50 YEAR FLOOD
10 YEAR FLOOD
STREAM BED
FLOOD PROFILES
BOX ELDER CREEK STUDY
REACH 6 - BOX ELDER CREEK
STA. 487+85 TO STA. 497+65
USDA - SCS
A- 6a



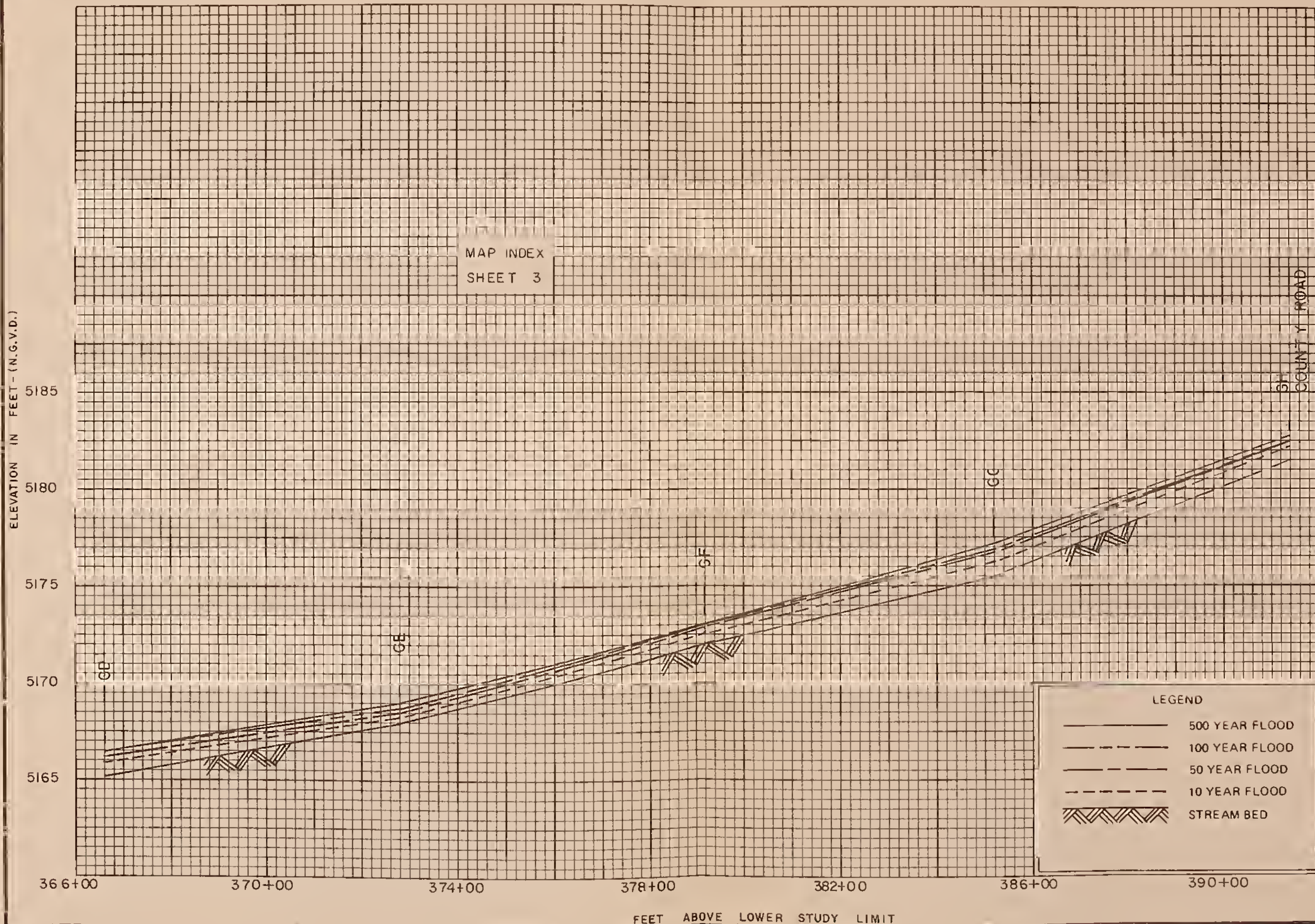
FLOOD PROFILES

BOX ELDER CREEK STUDY

REACH 7 - COAL CREEK
STA. 346+35 TO STA. 366+55

USDA-SCS

A-7



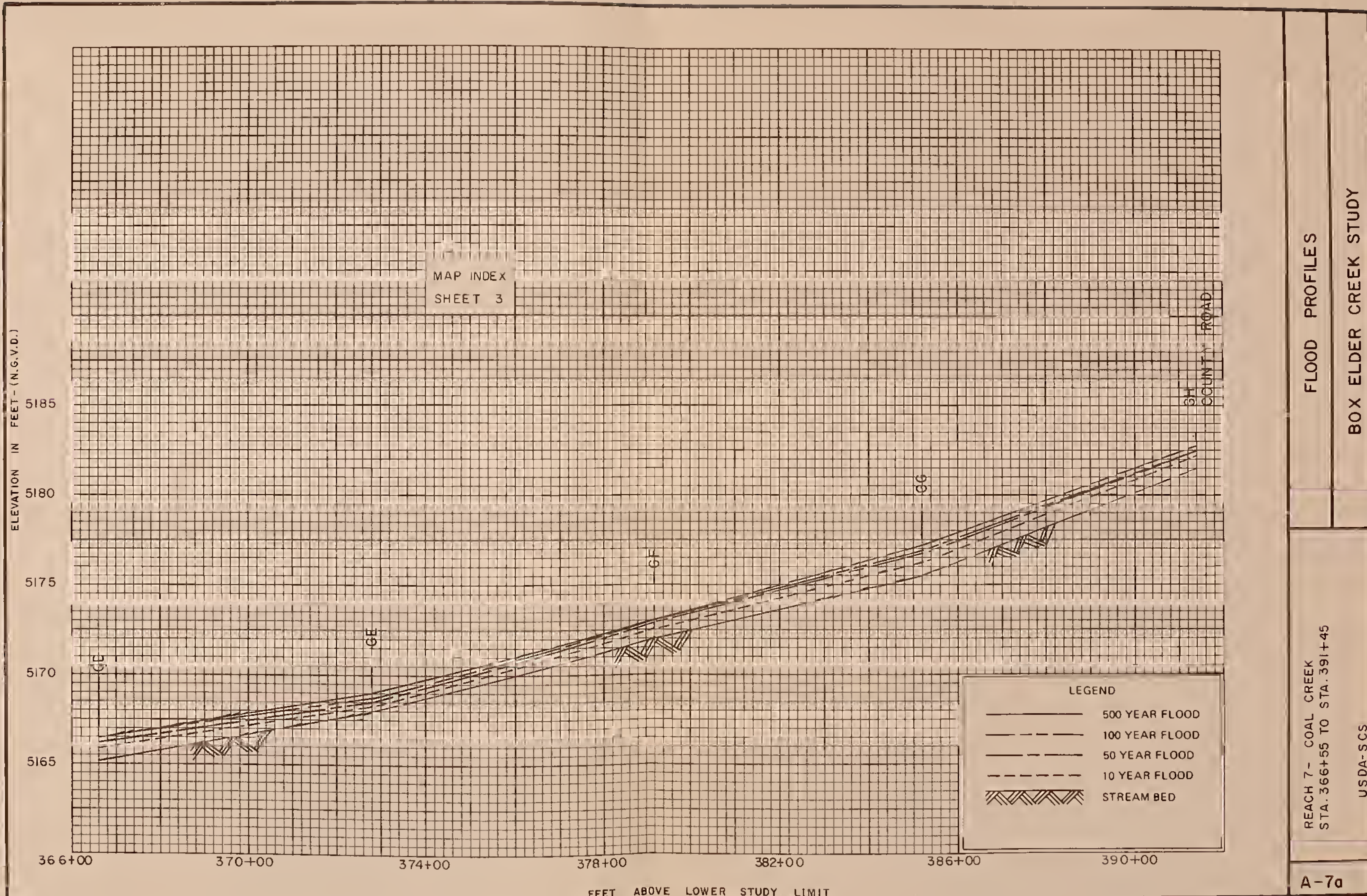
FLOOD PROFILES

BOX ELDER CREEK STUDY

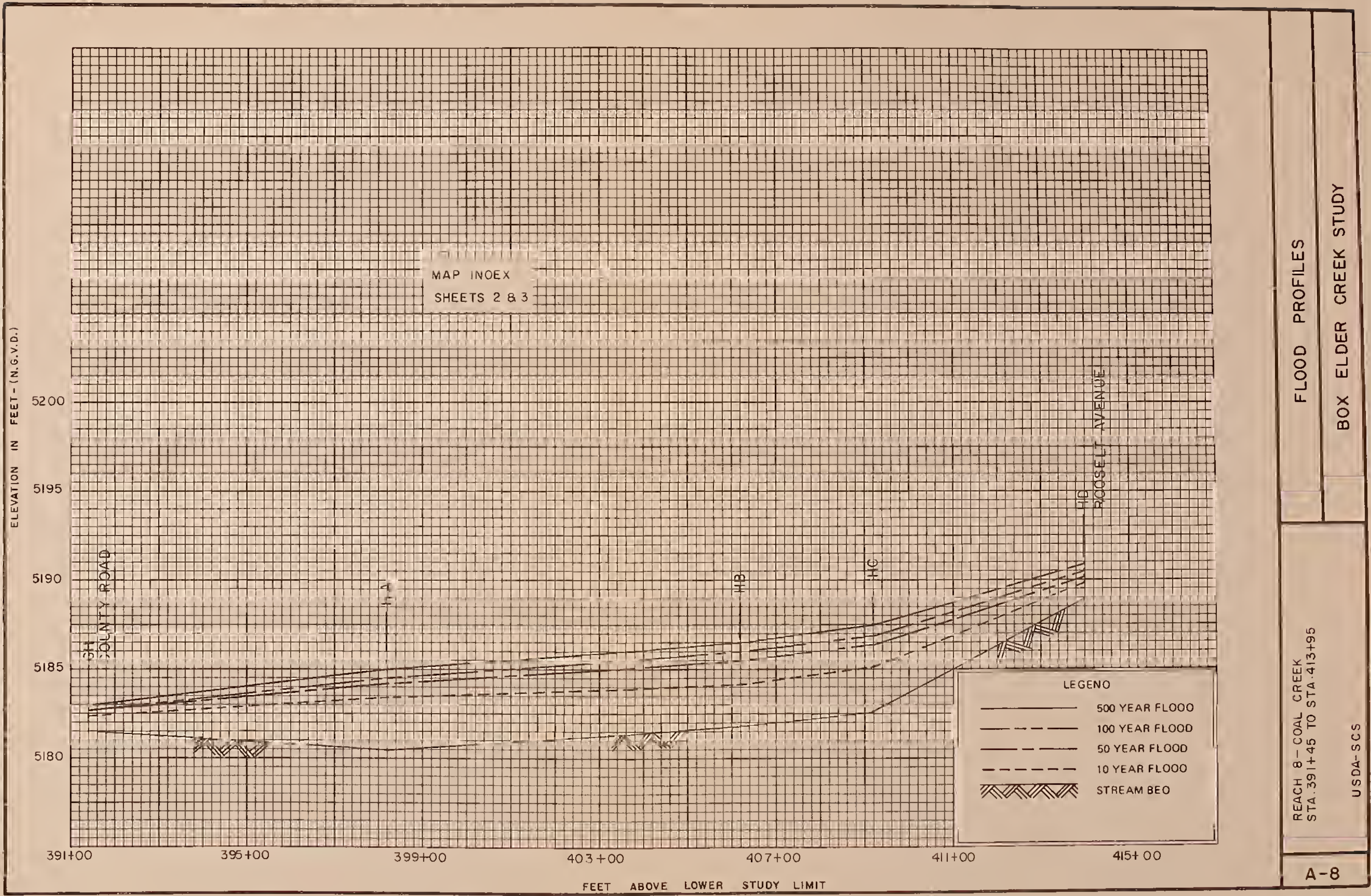
REACH 7- COAL CREEK
STA. 366+55 TO STA. 391+45

USDA-SCS

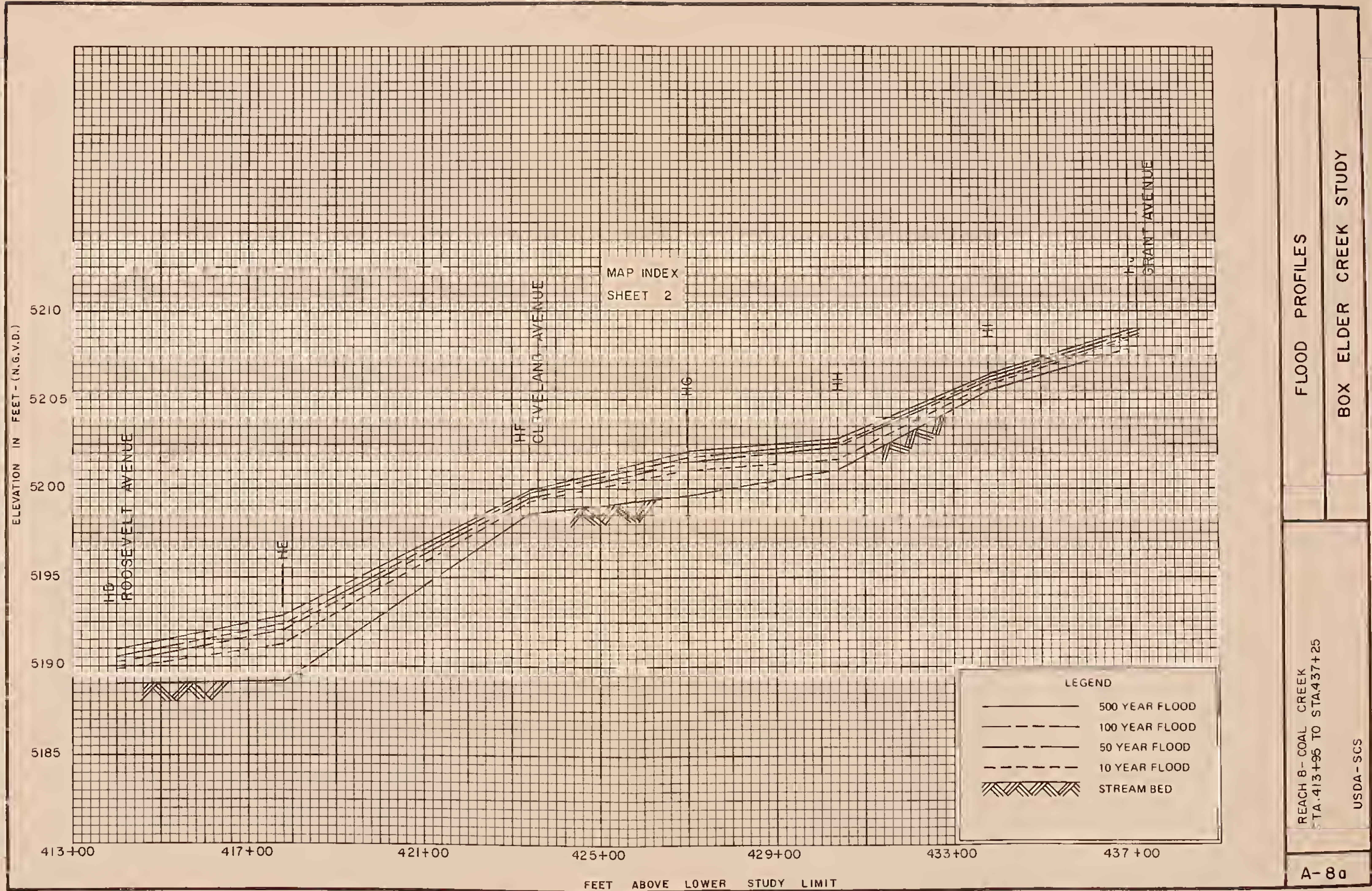
A-7a



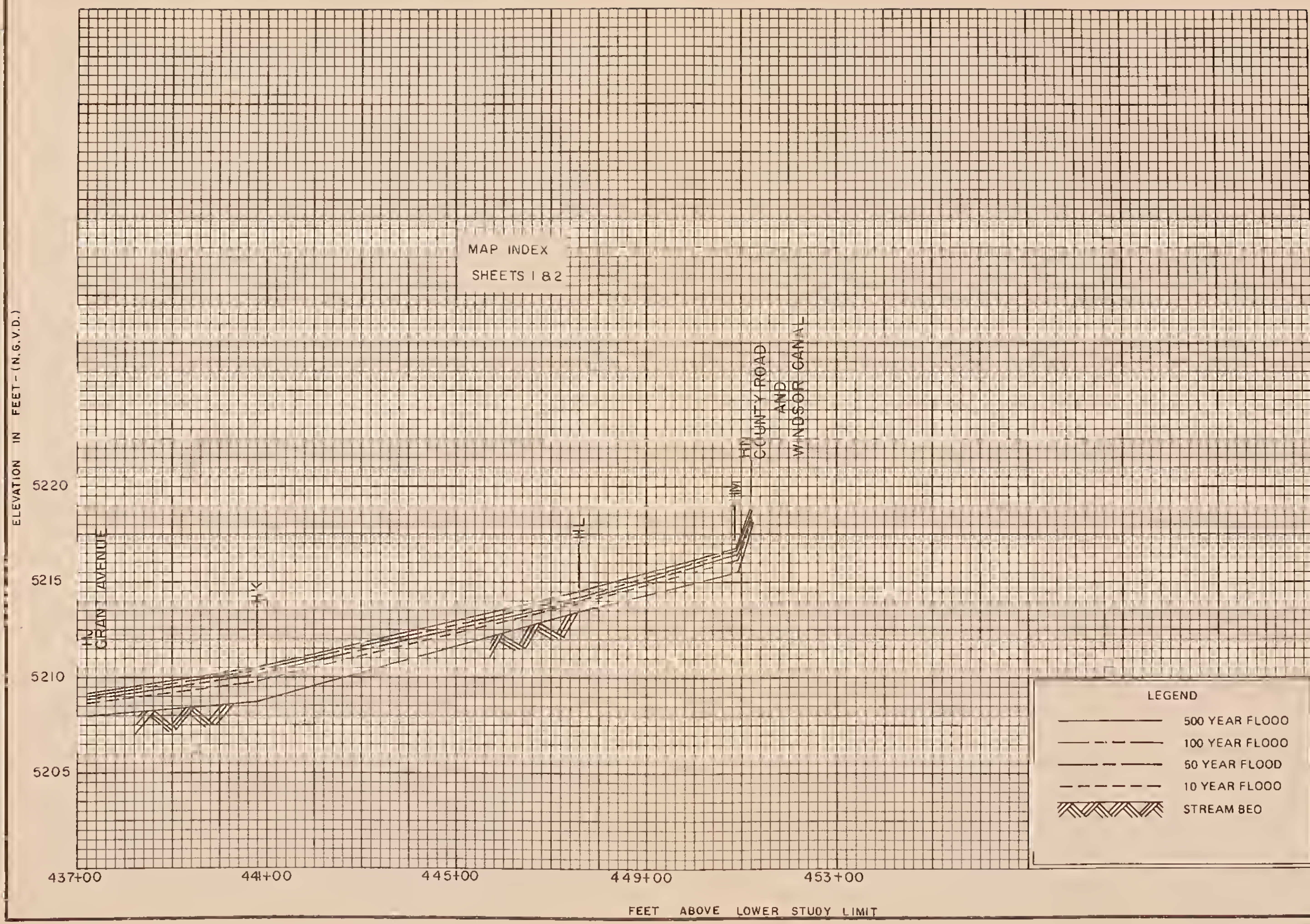
MAP INDEX
SHEET 3
ELEVATION IN FEET - (N.G.V.D.)
5165
5170
5175
5180
5185
GE
GE
GF
GG
GH
COUNTY ROAD
366+00
370+00
374+00
378+00
382+00
386+00
390+00
FEET ABOVE LOWER STUDY LIMIT
LEGEND
500 YEAR FLOOD
100 YEAR FLOOD
50 YEAR FLOOD
10 YEAR FLOOD
STREAM BED
FLOOD PROFILES
BOX ELDER CREEK STUDY
REACH 7 - COAL CREEK
STA. 366+55 TO STA. 391+45
USDA-SCS
A-7a



MAP INOEX
SHEETS 2 & 3
ELEVATION IN FEET - (N.G.V.D.)
5200
5195
5190
5185
5180
391+00
395+00
399+00
403+00
407+00
411+00
415+00
FEET ABOVE LOWER STUDY LIMIT
SH
COUNTY ROAD
HA
HB
HC
HD
ROOSELT AVENUE
LEGENO
500 YEAR FLOOO
100 YEAR FLOOD
50 YEAR FLOOD
10 YEAR FLOOO
STREAM BEO
FLOOD PROFILES
BOX ELDER CREEK STUDY
REACH 8 – COAL CREEK
STA. 391+45 TO STA. 413+95
USDA-SCS
A-8



MAP INDEX
SHEET 2
ROOSEVELT AVENUE
CLEVELAND AVENUE
GRANT AVENUE
HD
HE
HF
HG
HH
HI
HJ
ELEVATION IN FEET - (N.G.V.D.)
5185
5190
5195
5200
5205
5210
413+00
417+00
421+00
425+00
429+00
433+00
437+00
FEET ABOVE LOWER STUDY LIMIT
LEGEND
500 YEAR FLOOD
100 YEAR FLOOD
50 YEAR FLOOD
10 YEAR FLOOD
STREAM BED
FLOOD PROFILES
BOX ELDER CREEK STUDY
REACH 8 - COAL CREEK
STA.413+95 TO STA.437+25
USDA-SCS
A-8a



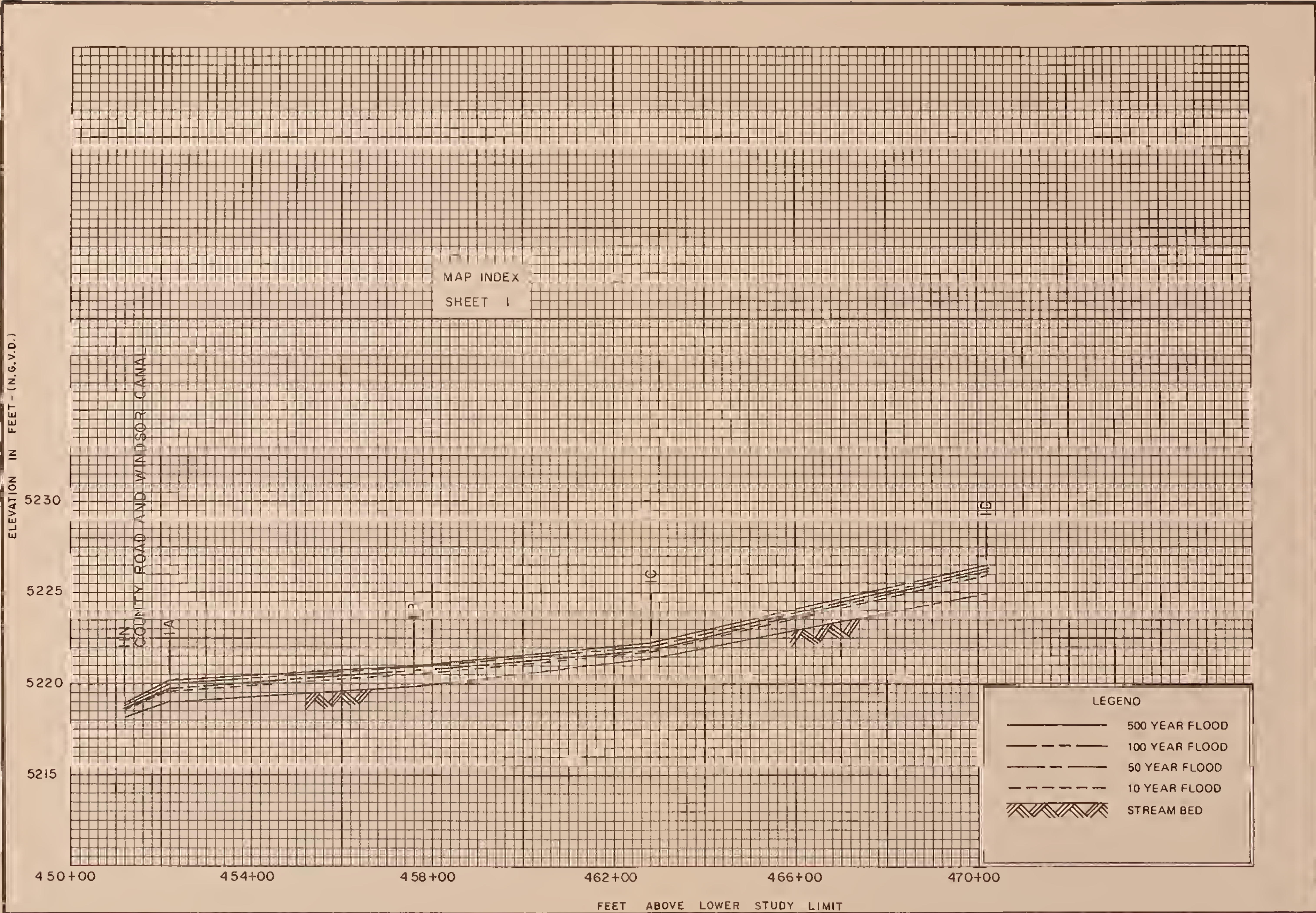
FLOOD PROFILES

BOX ELDER CREEK STUDY

REACH 8 - COAL CREEK
STA. 437+25 TO STA. 451+20

USDA-SCS

A-8b



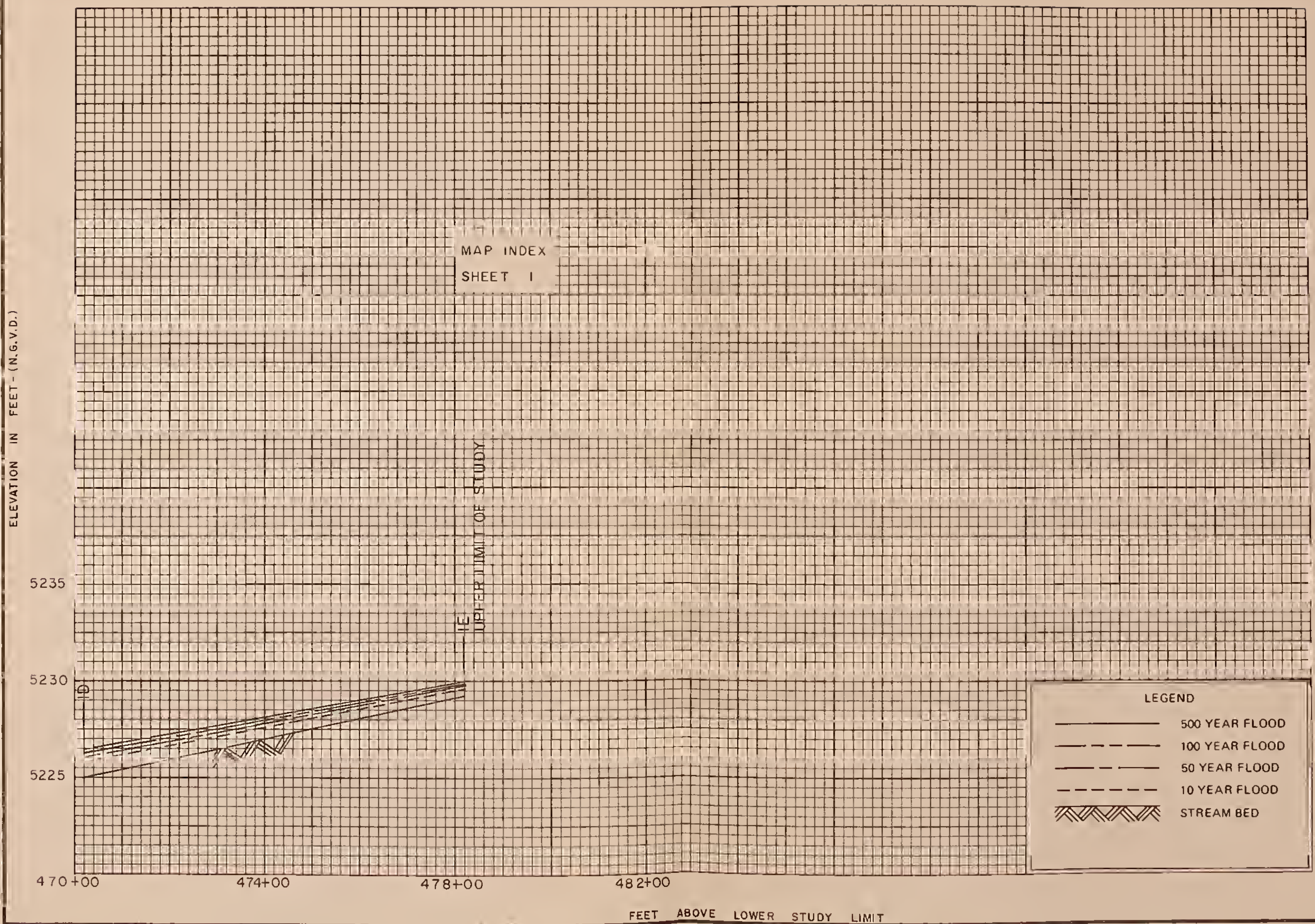
FLOOD PROFILES

BOX ELDER CREEK STUDY

REACH 9 - COAL CREEK
STA. 451+20 TO STA. 470+25

USDA-SCS

A-9



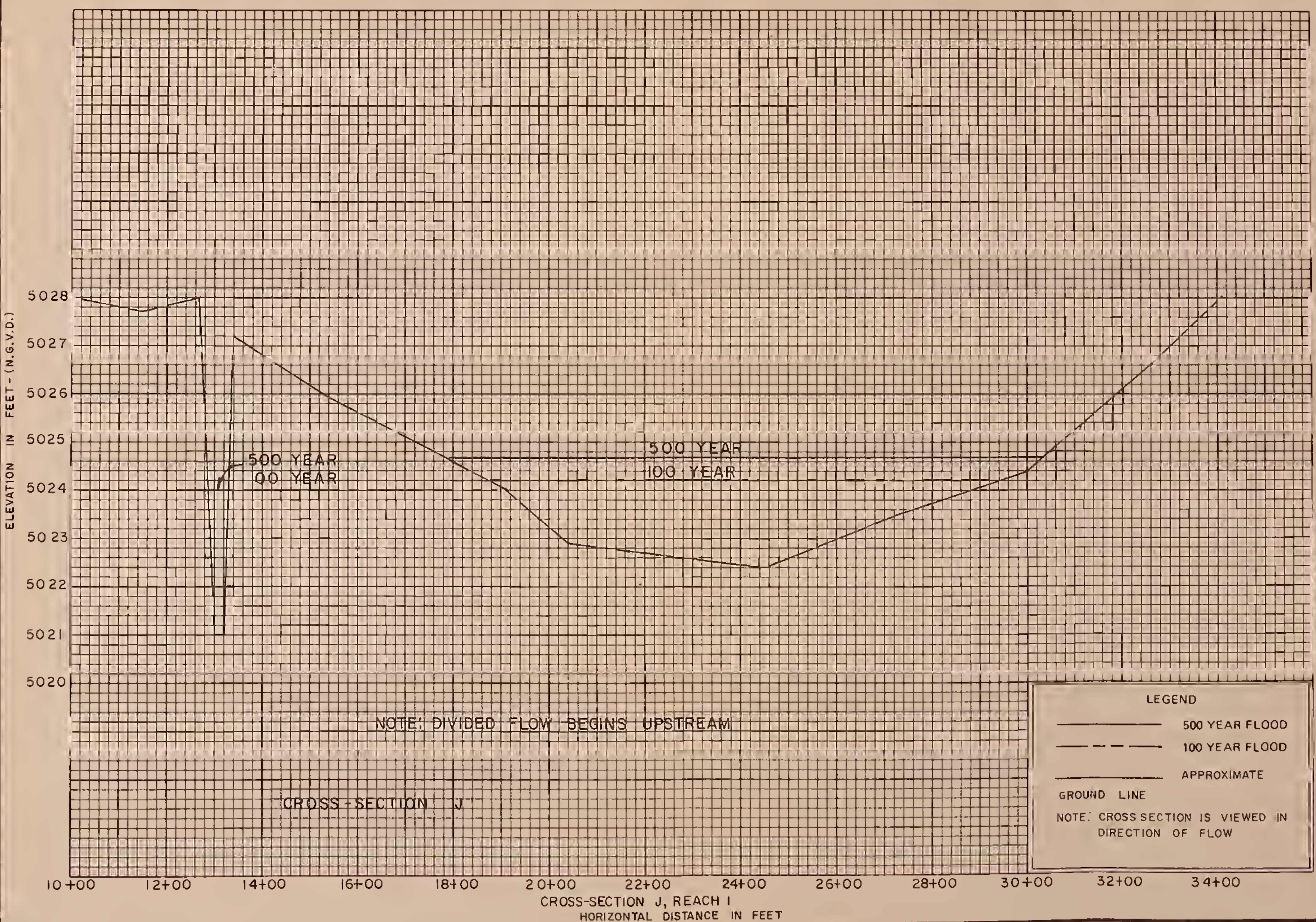
FLOOD PROFILES

BOX ELDER CREEK STUDY

REACH 9 - COAL CREEK
STA. 470+25 TO STA. 478+55

USDA-SCS

A-9a



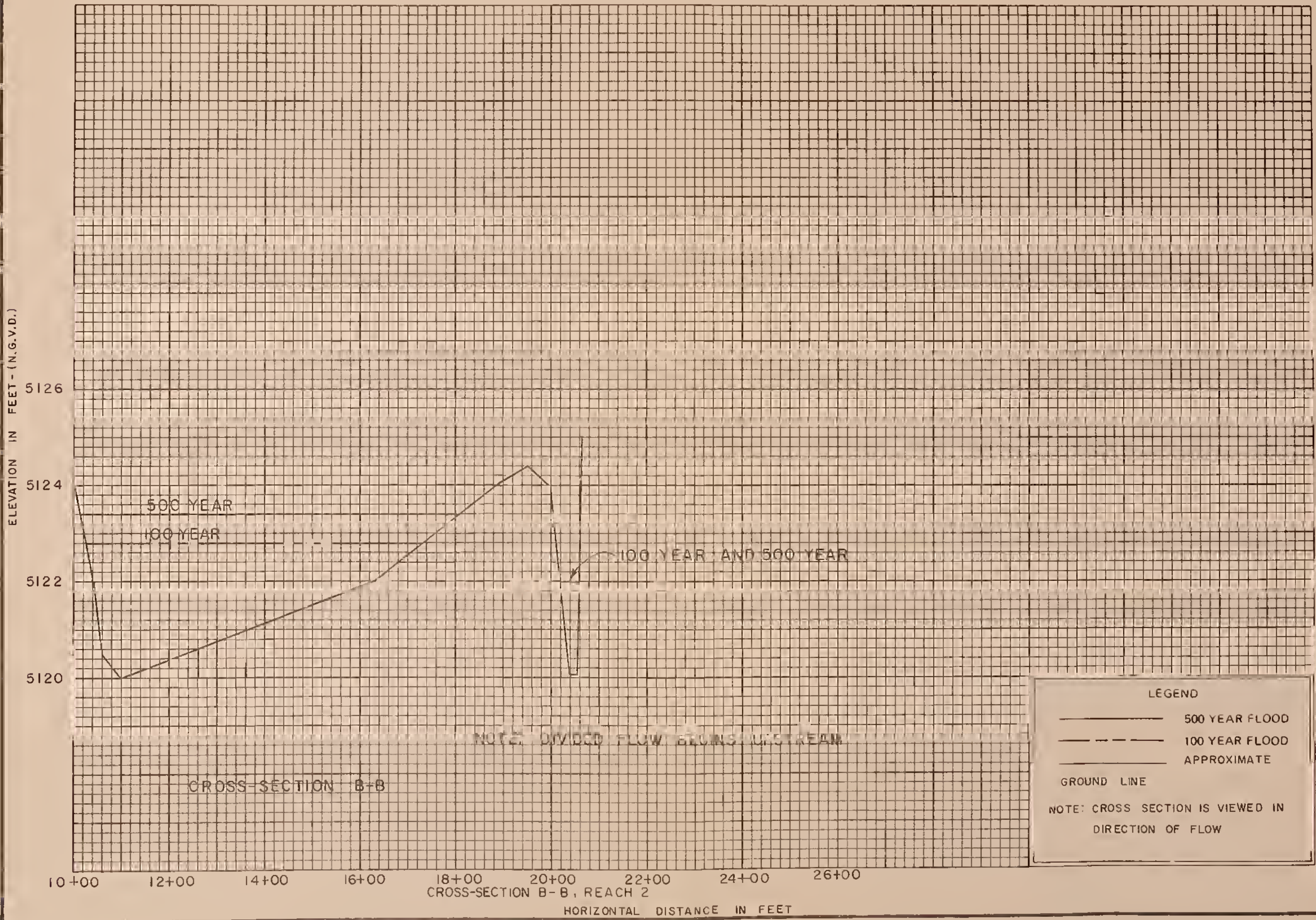
TYPICAL VALLEY CROSS-SECTION

BOX ELDER CREEK STUDY

REACH I - BOX ELDER CREEK
STA. 10+00 TO STA. 34+00

USDA-SCS

B-1



CROSS-SECTION B-B, REACH 2

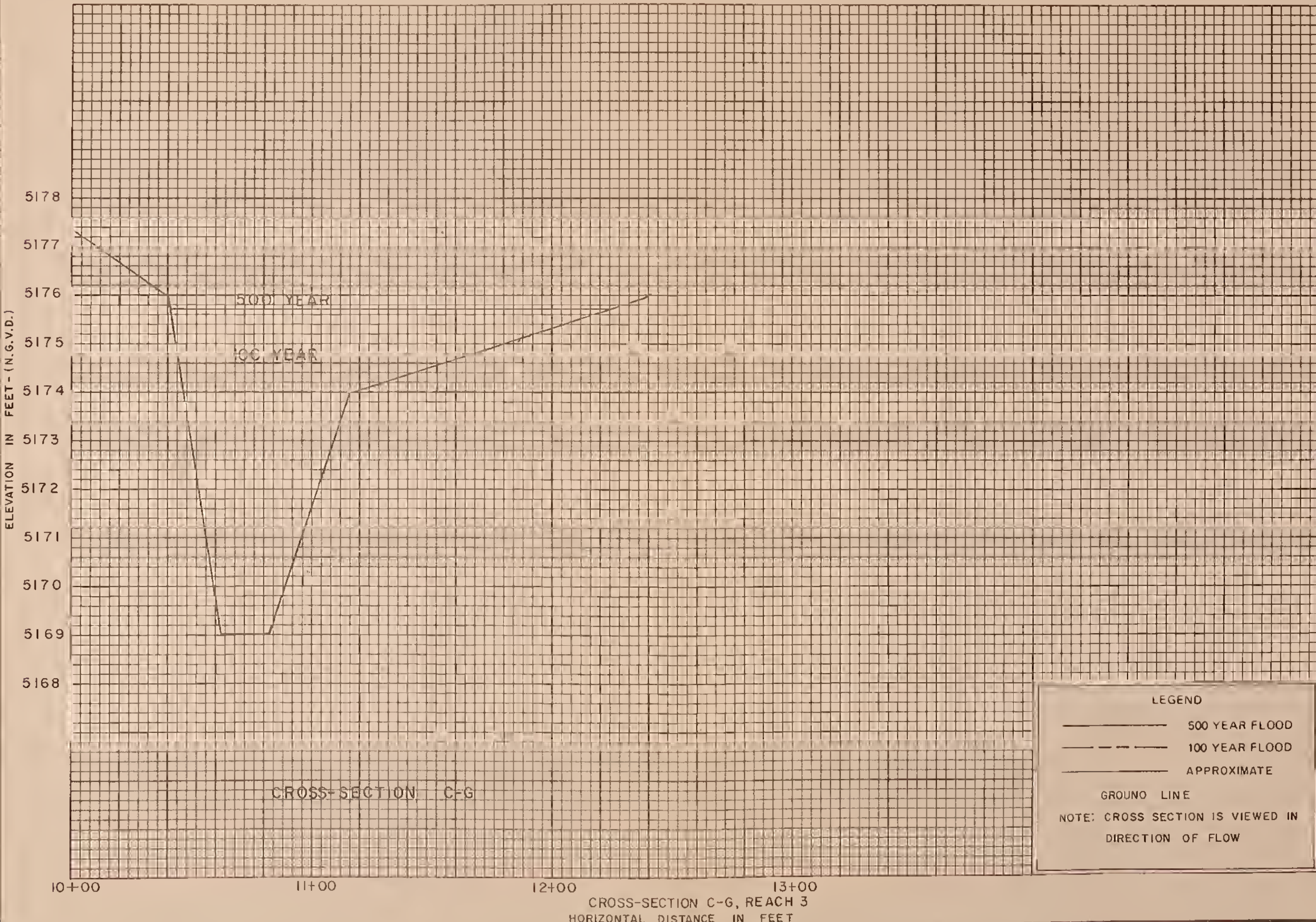
TYPICAL VALLEY CROSS-SECTION

BOX ELDER CREEK STUDY

REACH 2 - BOX ELDER CREEK
STA.10+00 TO STA.26+00

USDA - SCS

B-2



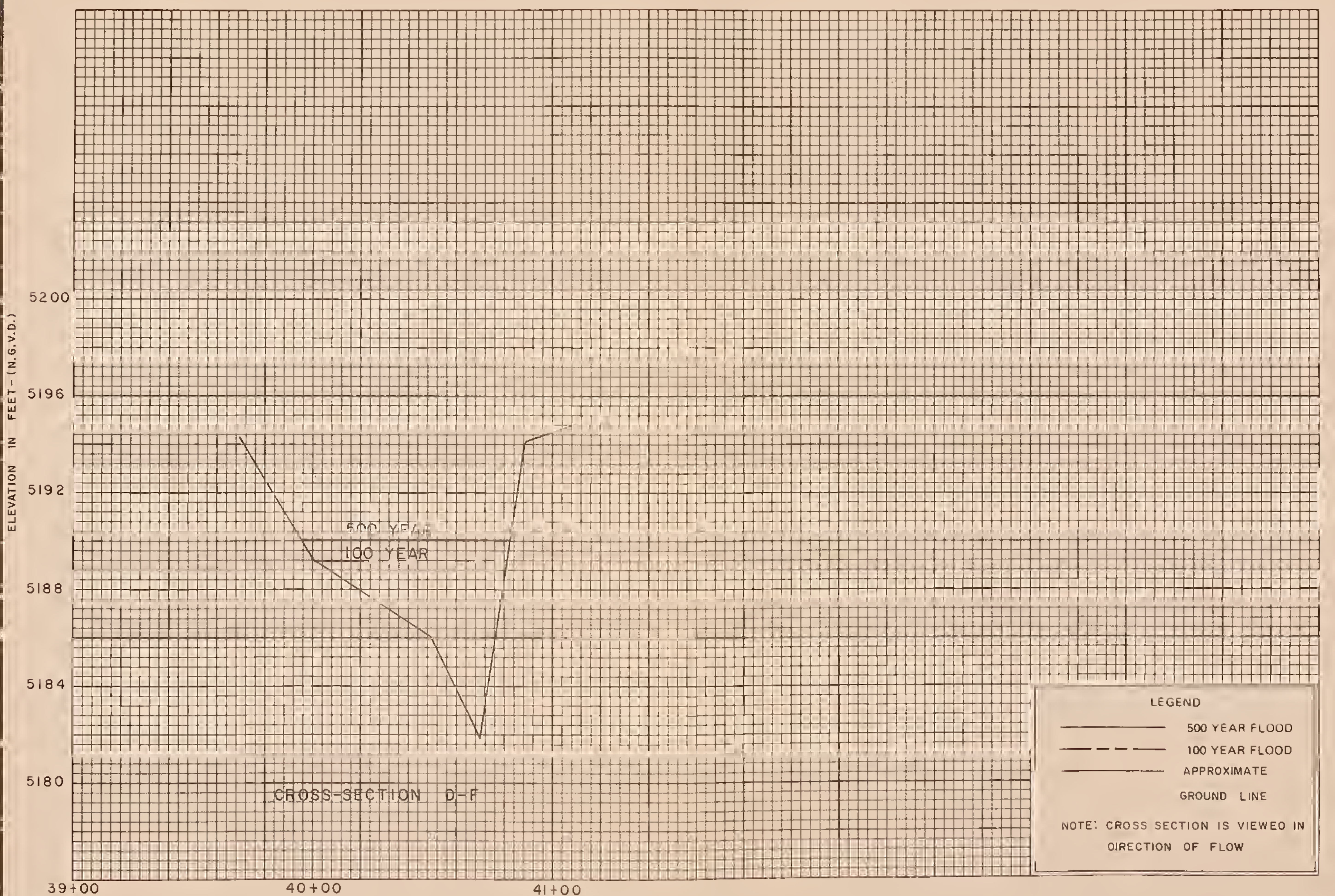
TYPICAL VALLEY CROSS-SECTION

BOX ELDER CREEK STUDY

REACH 3 - BOX ELDER CREEK
STA.10+00 TO STA.13+00

USDA-SCS

B-3



CROSS-SECTION D-F, REACH 4

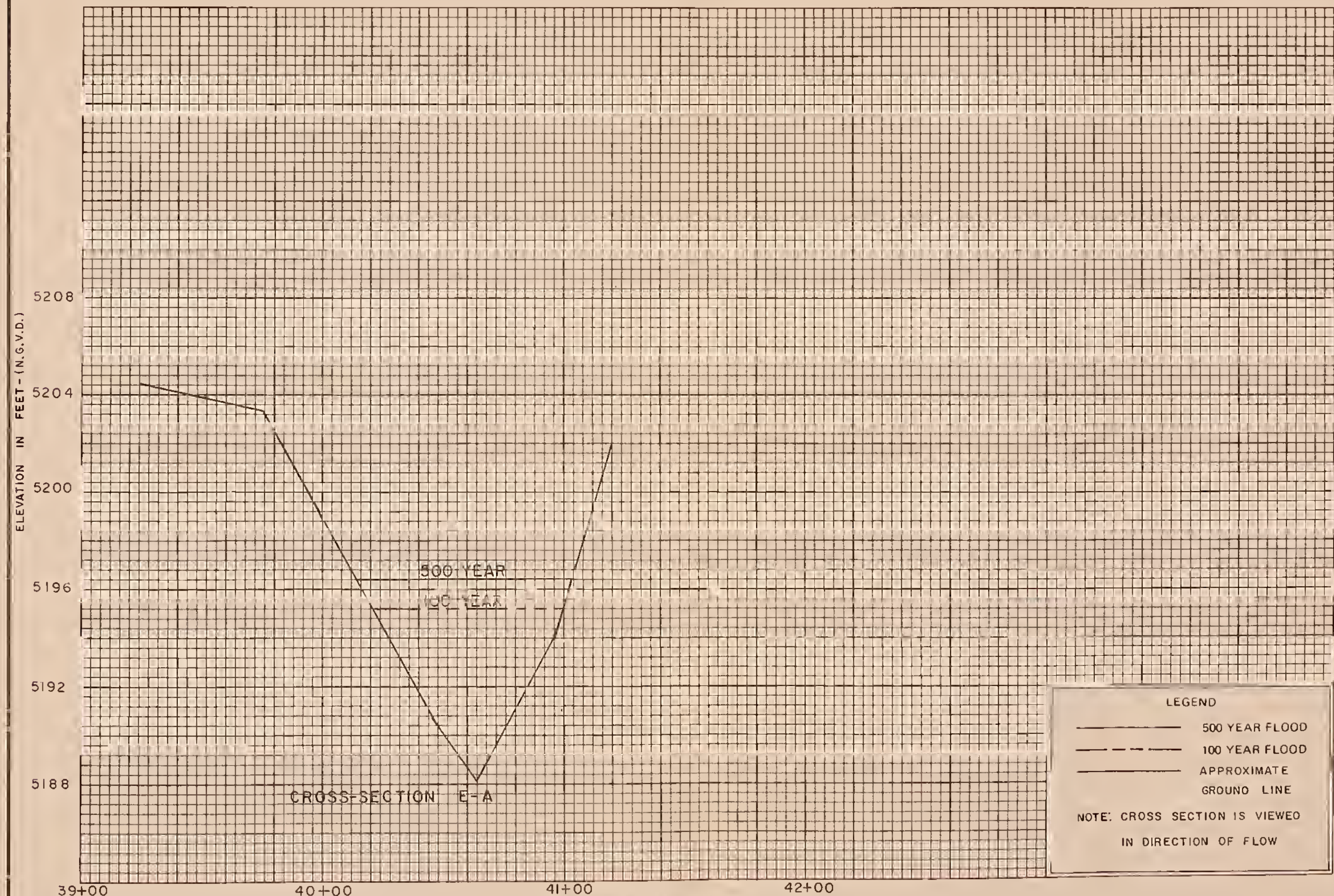
TYPICAL VALLEY CROSS-SECTION

BOX ELDER CREEK STUDY

REACH 4 - BOX ELDER CREEK
STA. 39+00 TO STA. 41+00

USDA - SCS

B-4



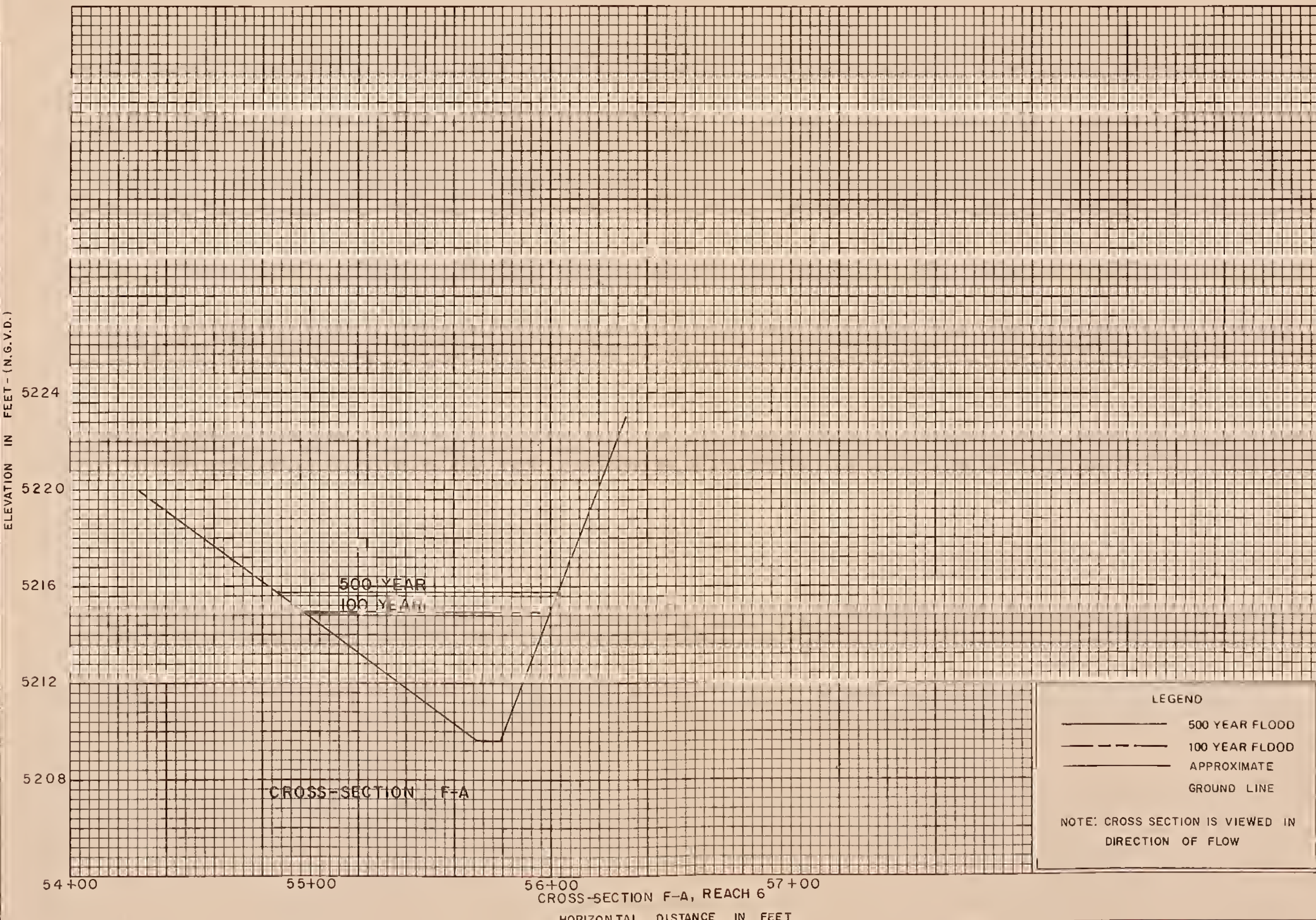
CROSS-SECTION E-A, REACH 5
HORIZONTAL DISTANCE IN FEET

TYPICAL VALLEY CROSS-SECTION

BOX ELDER CREEK STUDY

REACH 5 - BOX ELDER CREEK
STA. 39+00 TO STA. 42+00

USDA-SCS



CROSS-SECTION F-A, REACH 6

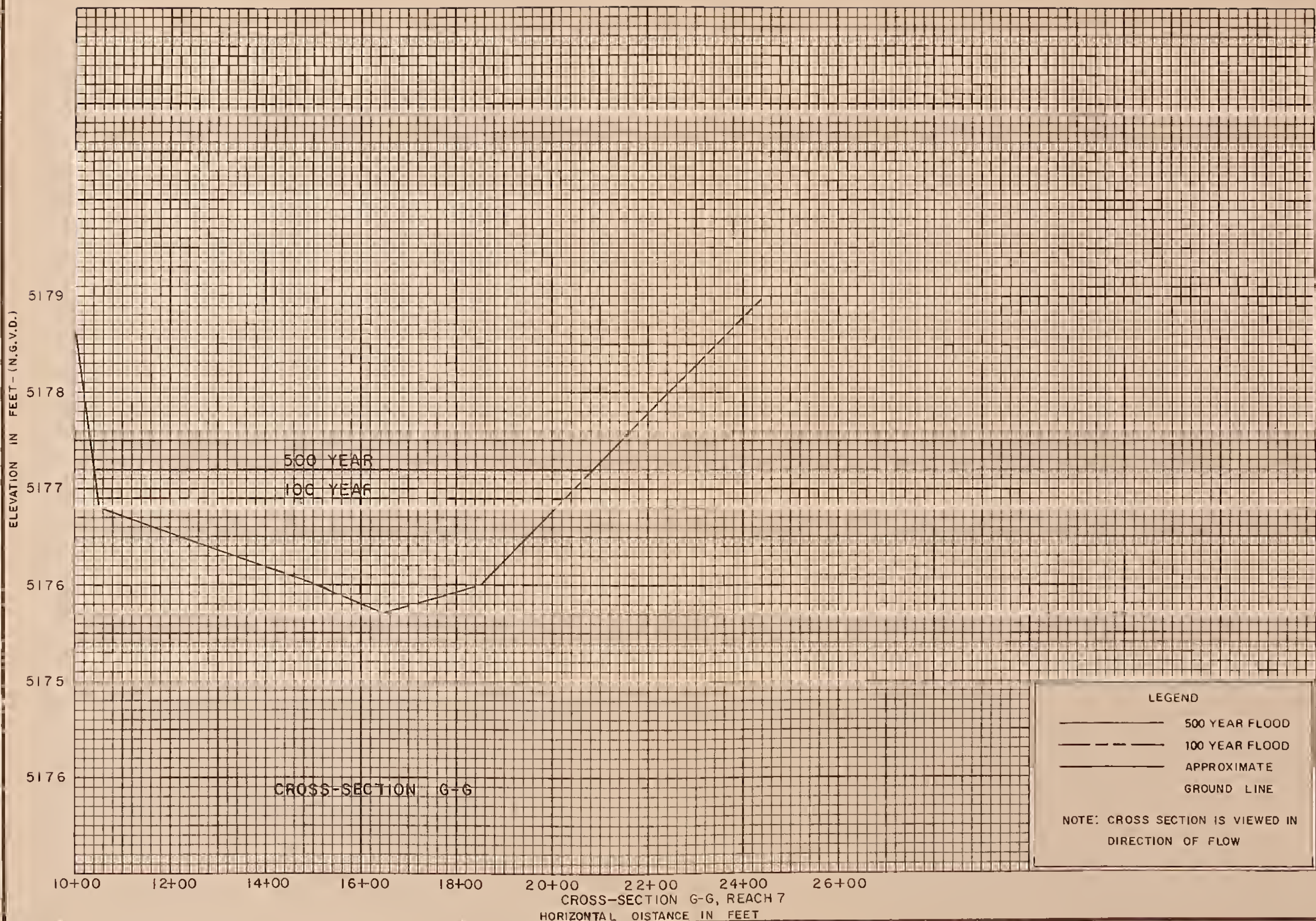
TYPICAL VALLEY CROSS-SECTION

BOX ELDER CREEK STUDY

REACH 6 - BOX ELDER CREEK
STA. 54+00 TO STA. 57+00

USDA - SCS

B-6



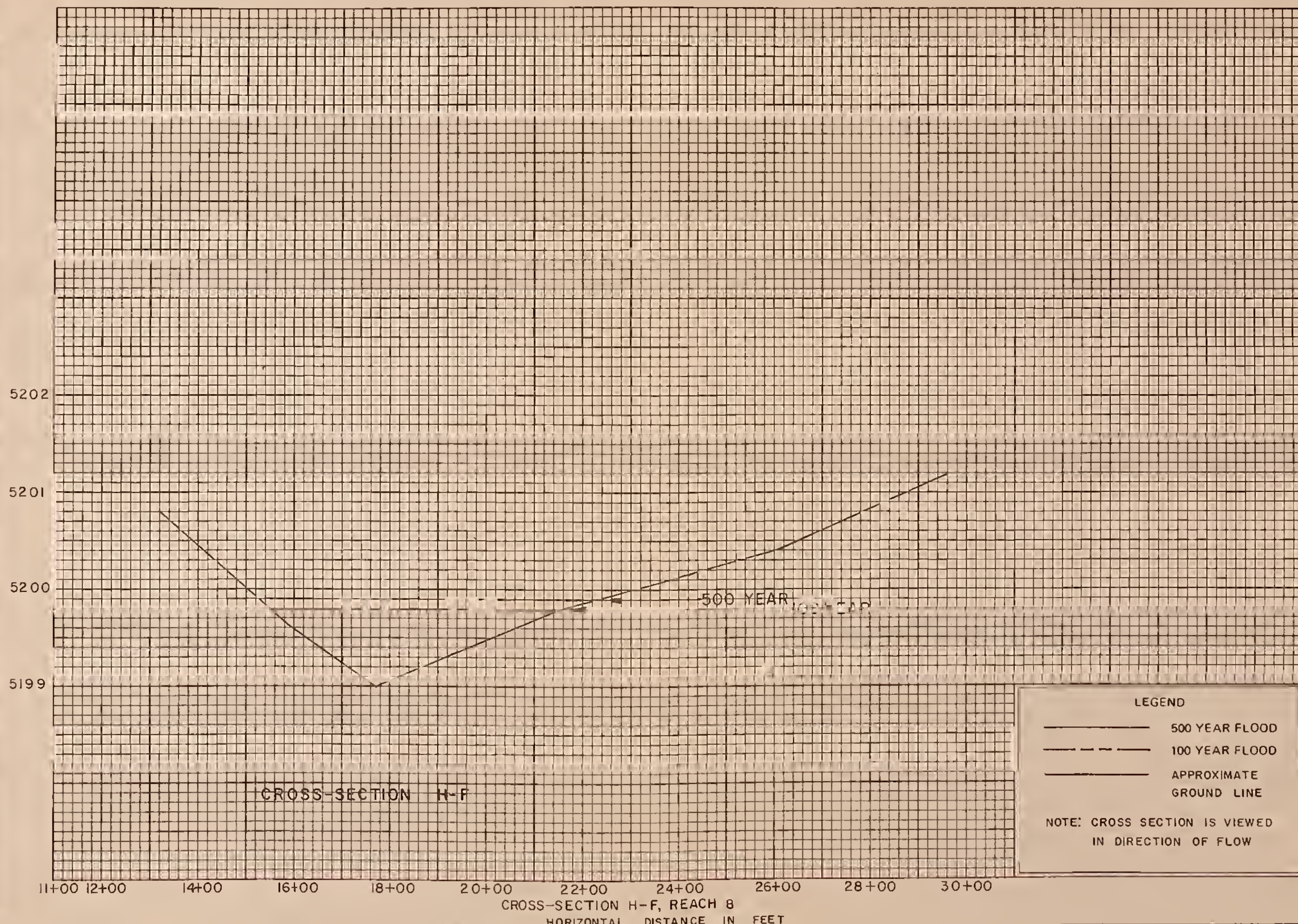
TYPICAL VALLEY CROSS-SECTION

BOX ELDER CREEK STUDY

REACH 7 — COAL CREEK TRIBUTARY
STA. 10+00 TO STA. 26+00

USDA - SCS

B-7



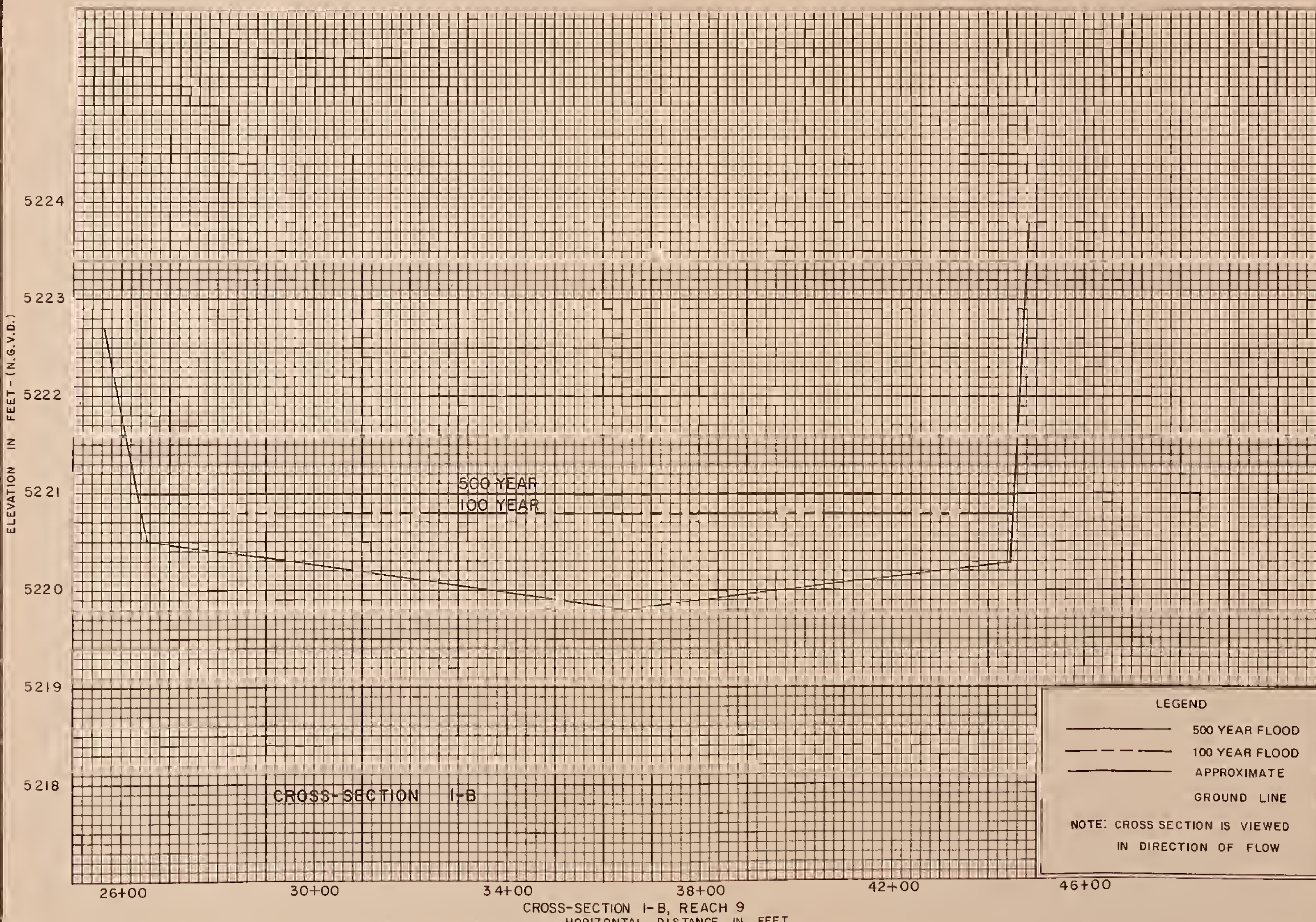
TYPICAL VALLEY CROSS-SECTION

BOX ELDER CREEK STUDY

REACH 8-COAL CREEK TRIBUTARY
STA.11+00 TO STA.30+00

USDA-SCS

B-8



TYPICAL VALLEY CROSS-SECTION

BOX ELDER CREEK STUDY

REACH 9 - COAL CREEK TRIBUTARY
STA. 25+00 TO STA. 46+00

USDA-SCS

B-9

TABLE 1

FLOOD FREQUENCY-ELEVATION AND DISCHARGE DATA 1/

Cross Section Designation	Stationing From Lower Study Limit (feet)	Identification	Stream Bed Elevation (ft.) N.G.V.D.	Crest-Elevation Feet National Geodetic Vertical Datum, and Peak Discharge c.f.s.			
				10-Year Flood	50-Year Flood	100-Year Flood	500-Year Flood
A-West	0+00	Begin Reach 1 Divided Flow	4991.8	4994.4 990	4995.3 2630	4995.7 3690	4996.2 5790
B-West	6+85	Divided Flow	4990.5	4994.7 990	4995.7 2630	4996.1 3690	4996.8 5790
C-West	13+30	Divided Flow	4992.0	4994.7 990	4995.8 2630	4996.3 3690	4997.0 5790
D-West	20+55	Divided Flow	4998.0	4998.2 990	4998.5 2630	4998.6 3690	4998.8 5790
E-West	26+55	Divided Flow	5002.4	5003.2 990	5003.6 2630	5003.8 3690	5004.1 5790
F-West	36+15	Divided Flow	5006.0	5007.0 990	5007.5 2630	5007.7 3690	5008.1 5790
G-West	45+80	Divided Flow	5011.1	5012.2 990	5012.7 2630	5012.9 3690	5013.2 5790
H-West	52-90	Divided Flow	5018.1	5019.4 990	5019.9 2630	5020.1 3690	5020.4 5790
I-West	59+70	Divided Flow	5019.2	5021.2 990	5022.1 2630	5022.4 3690	5022.9 5790

1/ Flood elevations pertain to the primary channel and usually remain constant in a lateral direction across the flood plain. However, flood elevations in the outer portions of a cross section may differ from the primary channel due to road crossings, upstream diversions, etc.

TABLE 1

FLOOD FREQUENCY-ELEVATION AND DISCHARGE DATA 1/

Cross Section Designation	Stationing From Lower Study Limit (feet)	Identification	Stream Bed Elevation (ft.) N.G.V.D.	Crest-Elevation Feet National Geodetic Vertical Datum, and Peak Discharge c.f.s.			
				10-Year Flood	50-Year Flood	100-Year Flood	500-Year Flood
J-West	68+50	Divided Flow	5022.4	5023.2 990	5023.9 2630	5024.2 3690	5024.7 5790
K-West	75+30	Divided Flow	5026.0	5027.7 990	5028.3 2630	5028.6 3690	5029.0 5790
L-West 2/	85+30		5031.2	5032.2 1140	5032.8 2780	5033.1 3840	5033.5 5940

1/ Flood elevations pertain to the primary channel and usually remain constant in a lateral direction across the flood plain. However, flood elevations in the outer portions of a cross section may differ from the primary channel due to road crossings, upstream diversions, etc.

2/ This is the upstream end of a divided flow reach. Water surface elevation may be slightly different than shown on the main channel at cross section L.

TABLE 1

FLOOD FREQUENCY-ELEVATION AND DISCHARGE DATA 1/

Cross Section Designation	Stationing From Lower Study Limit (feet)	Identification	Stream Bed Elevation (ft.) N.G.V.D.	Crest-Elevation Feet National Geodetic Vertical Datum, and Peak Discharge c.f.s.			
				10-Year Flood	50-Year Flood	100-Year Flood	500-Year Flood
A	0+00	Begin Reach 1 Divided Flow	4982.0	4984.8 150	4984.8 150	4984.8 150	4984.8 150
B	7+80	Divided Flow	4984.6	4987.5 150	4987.5 150	4987.5 150	4987.5 150
C	15+20	Divided Flow	4989.2	4990.5 150	4990.5 150	4990.5 150	4990.5 150
D	36+45	Divided Flow	4993.0	4992.9 150	4992.9 150	4992.9 150	4992.9 150
E	36+75	Divided Flow	4996.0	4997.8 150	4997.8 150	4997.8 150	4997.8 150
F	47+15	Divided Flow	5000.0	4002.6 150	5002.6 150	5002.6 150	5002.6 150
G	55+85	Divided Flow	5005.3	5006.3 150	5006.3 150	5006.3 150	5006.3 150
H	64+25	County Road Divided Flow	5016.0	5017.9 150	5017.9 150	5017.9 150	5017.9 150
I	72+45	Divided Flow	5020.5	5022.5 150	5022.5 150	5022.5 150	5022.5 150

1/ Flood elevations pertain to the primary channel and usually remain constant in a lateral direction across the flood plain. However, flood elevations in the outer portions of a cross section may differ from the primary channel due to road crossings, upstream diversions, etc.

TABLE 1

FLOOD FREQUENCY-ELEVATION AND DISCHARGE DATA 1/

Cross Section Desig-nation	Stationing From Lower Study Limit (feet)	Identification	Stream Bed Elevation (ft.) N.G.V.D.	Crest-Elevation Feet National Geodetic Vertical Datum, and Peak Discharge c.f.s.			
				10-Year Flood	50-Year Flood	100-Year Flood	500-Year Flood
J	78+65	Divided Flow	5021.0	5024.0 150	5024.0 150	5024.0 150	5024.0 150
K	85+50	Divided Flow	5028.5	5031.0 150	5031.0 150	5031.0 150	5031.0 150
L	93+50		5031.2	5032.7 1140	5033.2 2780	5033.4 3840	5033.7 5940
M	101+50		5031.3	5034.5 1140	5035.3 2780	5035.6 3840	5036.0 5940
N	107+80		5033.0	5037.2 1140	5037.9 2780	5038.0 3840	5038.4 5940
O	115+90		5035.0	5041.0 1140	5041.7 2780	5042.0 3840	5042.4 5940
P	130+40		5041.2	5043.2 1140	5044.5 2780	5044.9 3840	5045.5 5940
O	131+40	County Road	5041.3	5046.2 1140	5048.3 2780	5048.6 3840	5048.7 5940
R	132+40		5041.5	5048.2 1140	5048.7 2780	5048.9 3840	5049.3 5940

1/ Flood elevations pertain to the primary channel and usually remain constant in a lateral direction across the flood plain. However, flood elevations in the outer portions of a cross section may differ from the primary channel due to road crossings, upstream diversions, etc.

TABLE 1 FLOOD FREQUENCY-ELEVATION AND DISCHARGE DATA 1/

Cross Section Designation	Stationing From Lower Study Limit (feet)	Identification	Stream Bed Elevation (ft.) N.G.V.D.	Crest-Elevation Feet National Geodetic Vertical Datum, and Peak Discharge c.f.s.			
				10-Year Flood	50-Year Flood	100-Year Flood	500-Year Flood
S	143+80		5045.2	5049.4 1140	5050.0 2780	5050.2 3840	5050.8 5940
T	151+50		5049.0	5053.7 1140	5055.2 2780	5055.6 3840	5056.1 5940
U	159+50		5053.3	5058.6 1140	5061.5 2780	5062.0 3840	5062.5 5940
V	167+70		5057.5	5064.2 1140	5066.0 2780	5066.4 3840	5066.8 5940
W	176+50		5061.0	5067.4 1140	5069.7 2780	5070.4 3840	5070.9 5940
X	184+90		5063.0	5070.0 1140	5073.2 2780	5073.7 3840	5074.7 5940
Y	193+90		5069.7	5074.2 1140	5076.9 2780	5078.2 3840	5079.0 5940
Z	195+90	County Road	5071.2	5076.2 1140	5079.7 2780	5081.9 3840	5082.2 5940

1/ Flood elevations pertain to the primary channel and usually remain constant in a lateral direction across the flood plain. However, flood elevations in the outer portions of a cross section may differ from the primary channel due to road crossings, upstream diversions, etc.

TABLE 1

FLOOD FREQUENCY-ELEVATION AND DISCHARGE DATA 1/

Cross Section Designation	Stationing From Lower Study Limit (feet)	Identification	Stream Bed Elevation (ft.) N.G.V.D.	Crest-Elevation Feet National Geodetic Vertical Datum, and Peak Discharge c.f.s.			
				10-Year Flood	50-Year Flood	100-Year Flood	500-Year Flood
AA	197+90		5072.7	5078.7 1140	5082.4 2780	5082.5 3840	5082.9 5940
AB	205+50		5079.2	5081.3 1140	5082.5 2780	5082.6 3840	5083.0 5940
AC	212+80		5085.9	5088.1 1140	5088.5 2780	5089.1 3840	5089.5 5940
AD	223+20		5091.6	5094.8 1140	5094.9 2780	5094.9 3840	5094.9 5940
AE	231+85		5099.8	5100.9 1140	5101.5 2780	5101.5 3840	5101.5 5940
AF	239+65		5095.9	5103.5 1140	5104.3 2780	5104.4 3840	5104.4 5940
AG	247+05		5098.1	5104.7 1140	5106.1 2780	5106.6 3840	5107.7 5940
AH	253+45		5100.0	5105.7 1140	5108.2 2780	5109.4 3840	5110.3 5940
AI	255+15	County Road	5103.3	5107.1 1140	5109.2 2780	5110.3 3840	5111.7 5940
AJ	258+05	Confluence with Indian Creek	5106.5	5111.5 1140	5112.5 2780	5112.8 3840	5113.7 5940

1/ Flood elevations pertain to the primary channel and usually remain constant in a lateral direction across the flood plain. However, flood elevations in the outer portions of a cross section may differ from the primary channel due to road crossings, upstream diversions, etc.

TABLE 1 FLOOD FREQUENCY-ELEVATION AND DISCHARGE DATA 1/

Cross Section Designation	Stationing From Lower Study Limit (feet)	Identification	Stream Bed Elevation (ft.) N.G.V.D.	Crest-Elevation Feet National Geodetic Vertical Datum, and Peak Discharge c.f.s.			
				10-Year Flood	50-Year Flood	100-Year Flood	500-Year Flood
AJ	258+05	Begin Reach 2	5106.5	5111.5 1140	5112.5 2780	5112.8 3840	5113.7 5940
BA-East	267+05	Divided Flow	5113.2	5115.8 890	5116.3 2530	5116.6 3590	5117.0 5690
BB-East	280+45	Divided Flow	5120.5	5121.8 890	5122.6 2530	5122.8 3590	5123.4 5690
BC-East	288+85	Divided Flow	5123.5	5126.8 890	5127.3 2530	5127.5 3590	5127.9 5690
BD-East	297+75	Divided Flow	5126.0	5128.4 890	5129.4 2530	5129.7 3590	5130.3 5690
BE-East 2/	321+75		5135.0	5138.8 900	5139.1 1670	5139.2 2140	5139.5 3100

1/ Flood elevations pertain to the primary channel and usually remain constant in a lateral direction across the flood plain. However, flood elevations in the outer portions of a cross section may differ from the primary channel due to road crossings, upstream diversions, etc.

2/ This is the upstream end of a divided flow reach. Water surface elevations maybe slightly different than shown on the main channel at cross section BE.

TABLE 1 FLOOD FREQUENCY-ELEVATION AND DISCHARGE DATA 1/

Cross Section Desig- nation	Stationing From Lower Study Limit (feet)	Identification	Stream Bed Elevation (ft.) N.G.V.D.	Crest-Elevation Feet National Geodetic Vertical Datum, and Peak Discharge c.f.s.			
				10-Year Flood	50-Year Flood	100-Year Flood	500-Year Flood
AJ	258+05	Begin Reach 2	5106.5	5111.5 1140	5112.5 2780	5112.8 3840	5113.7 5940
BA	268+85	Divided Flow	5110.0	5114.0 250	5114.0 250	5114.0 250	5114.0 250
BB	281+65	Divided Flow	5120.1	5122.0 250	5122.0 250	5122.0 250	5122.0 250
BC	292+75	Divided Flow	5123.8	5126.5 250	5126.5 250	5126.5 250	5126.5 250
BD	303+35	Divided Flow	5129.5	5131.7 250	5131.7 250	5131.7 250	5131.7 250
BE	316+35		5135.0	5139.1 900	5139.5 1670	5139.7 2140	5140.0 3100
BG	334+15	County Road	5146.1	5147.1 900	5147.5 1670	5147.5 2140	5147.5 3100
BH	335+95		5146.1	5148.9 900	5148.9 1670	5149.2 2140	5149.6 3100

1/ Flood elevations pertain to the primary channel and usually remain constant in a lateral direction across the flood plain. However, flood elevations in the outer portions of a cross section may differ from the primary channel due to road crossings, upstream diversions, etc.

TABLE 1

FLOOD FREQUENCY-ELEVATION AND DISCHARGE DATA 1/

Cross Section Designation	Stationing From Lower Study Limit (feet)	Identification	Stream Bed Elevation (ft.) N.G.V.D.	Crest-Elevation Feet National Geodetic Vertical Datum, and Peak Discharge c.f.s.			
				10-Year Flood	50-Year Flood	100-Year Flood	500-Year Flood
BI	339+55		5146.3	5149.9 900	5150.6 1670	5150.9 2140	5151.4 3100
BJ	341+05		5147.5	5150.0 900	5150.7 1670	5151.0 2140	5151.6 3100
BK	343+85	Interstate 25	5147.5	5150.1 900	5150.8 1670	5151.2 2140	5151.8 3100
BL	346+35	Confluence with Coal Creek	5149.0	5152.9 900	5153.6 1670	5153.9 2140	5154.4 3100

1/ Flood elevations pertain to the primary channel and usually remain constant in a lateral direction across the flood plain. However, flood elevations in the outer portions of a cross section may differ from the primary channel due to road crossings, upstream diversions, etc.

TABLE 1

FLOOD FREQUENCY-ELEVATION AND DISCHARGE DATA 1/

Cross Section Designation	Stationing From Lower Study Limit (feet)	Identification	Stream Bed Elevation (ft.) N.G.V.D.	Crest-Elevation Feet National Geodetic Vertical Datum, and Peak Discharge c.f.s.			
				10-Year Flood	50-Year Flood	100-Year Flood	500-Year Flood
BL	346+35	Begin Reach 3	5149.0	5152.9 900	5153.6 1670	5153.9 2140	5154.4 3100
CA	352+85		5151.5	5155.4 480	5156.2 920	5156.5 1170	5156.9 1690
CB	359+85		5154.0	5156.9 480	5157.9 920	5158.3 1170	5159.0 1690
CC	366+85		5156.3	5160.7 480	5162.0 920	5162.6 1170	5163.3 1690
CD	373+35		5159.0	5162.5 480	5164.0 920	5164.7 1170	5165.6 1690
CE	379+35		5161.0	5165.0 480	5166.2 920	5166.8 1170	5167.8 1690
CF	384+35		5166.1	5169.0 480	5170.4 920	5171.0 1170	5172.0 1690

1/ Flood elevations pertain to the primary channel and usually remain constant in a lateral direction across the flood plain. However, flood elevations in the outer portions of a cross section may differ from the primary channel due to road crossings, upstream diversions, etc.

TABLE 1

FLOOD FREQUENCY-ELEVATION AND DISCHARGE DATA 1/

Cross Section Desig- nation	Stationing From Lower Study Limit (feet)	Identification	Stream Bed Elevation (ft.) N.G.V.D.	Crest-Elevation Feet National Geodetic Vertical Datum, and Peak Discharge c.f.s.			
				10-Year Flood	50-Year Flood	100-Year Flood	500-Year Flood
CG	390+55		5169.0	5172.6 480	5174.0 920	5174.6 1170	5175.7 1690
CH	395+55		5170.0	5174.0 480	5175.4 920	5175.9 1170	5176.8 1690
CI	400+85	County Road	5177.9	5179.5 480	5180.0 920	5180.3 1170	5180.7 1690

1/ Flood elevations pertain to the primary channel and usually remain constant in a lateral direction across the flood plain. However, flood elevations in the outer portions of a cross section may differ from the primary channel due to road crossings, upstream diversions, etc.

TABLE 1

FLOOD FREQUENCY-ELEVATION AND DISCHARGE DATA 1/

Cross Section Designation	Stationing From Lower Study Limit (feet)	Identification	Stream Bed Elevation (ft.) N.G.V.D.	Crest-Elevation Feet National Geodetic Vertical Datum, and Peak Discharge c.f.s.			
				10-Year Flood	50-Year Flood	100-Year Flood	500-Year Flood
CI	400+85	Begin Reach 4	5177.9	5179.5 480	5180.0 920	5180.3 1170	5180.7 1690
DA	408+85		5178.8	5182.5 480	5183.5 920	5183.9 1170	5184.7 1690
DB	413+70		5180.8	5183.5 480	5184.5 920	5185.0 1170	5185.8 1690
DC	414+00	Colorado & Southern Railroad Bridge	5180.8	5183.6 480	5184.7 920	5185.1 1170	5185.9 1690
DE	416+00		5180.7	5184.5 480	5185.2 920	5185.6 1170	5186.5 1690
DF	419+00		5181.9	5187.3 480	5188.7 920	5189.2 1170	5190.1 1690
DG	423+50		5184.4	5188.9 480	5190.3 920	5190.9 1170	5191.8 1690

1/ Flood elevations pertain to the primary channel and usually remain constant in a lateral direction across the flood plain. However, flood elevations in the outer portions of a cross section may differ from the primary channel due to road crossings, upstream diversions, etc.

TABLE 1 FLOOD FREQUENCY-ELEVATION AND DISCHARGE DATA 1/

Cross Section Desig- nation	Stationing From Lower Study Limit (feet)	Identification	Stream Bed Elevation (ft.) N.G.V.D.	Crest-Elevation Feet National Geodetic Vertical Datum, and Peak Discharge c.f.s.			
				10-Year Flood	50-Year Flood	100-Year Flood	500-Year Flood
DH	427+00		5185.4	5189.7 480	5191.2 920	5191.8 1170	5192.9 1690
DI	429+90		5187.4	5191.6 480	5193.0 920	5193.7 1170	5194.8 1690
DJ	430+40	Cleveland Ave.	5187.4	5191.6 480	5193.0 920	5193.7 1170	5194.8 1690

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TABLE 1

FLOOD FREQUENCY-ELEVATION AND DISCHARGE DATA 1/

Cross Section Desig-nation	Stationing From Lower Study Limit (feet)	Identification	Stream Bed Elevation (ft.) N.G.V.D.	Crest-Elevation Feet National Geodetic Vertical Datum, and Peak Discharge c.f.s.			
				10-Year Flood	50-Year Flood	100-Year Flood	500-Year Flood
DJ	430+40	Begin Reach 5	5187.4	5191.6 480	5193.0 920	5193.7 1170	5194.8 1690
EA	433+40		5188.0	5192.9 480	5194.4 920	5195.1 1170	5196.3 1690
EB	437+60		5189.5	5193.7 480	5195.1 920	5195.8 1170	5196.9 1690
EC	443+00		5194.8	5198.5 480	5199.6 920	5200.1 1170	5200.9 1690
EF	447+15		5197.3	5201.0 480	5202.3 920	5202.9 1170	5203.9 1690
EG	451+25		5198.0	5201.9 480	5203.2 920	5203.8 1170	5204.8 1690
EH	457+25		5198.6	5203.1 480	5204.7 920	5205.4 1170	5206.5 1690

1/ Flood elevations pertain to the primary channel and usually remain constant in a lateral direction across the flood plain. However, flood elevations in the outer portions of a cross section may differ from the primary channel due to road crossings, upstream diversions, etc.

TABLE 1

FLOOD FREQUENCY-ELEVATION AND DISCHARGE DATA 1/

Cross Section Designation	Stationing From Lower Study Limit (feet)	Identification	Stream Bed Elevation (ft.) N.G.V.D.	Crest-Elevation Feet National Geodetic Vertical Datum, and Peak Discharge c.f.s.			
				10-Year Flood	50-Year Flood	100-Year Flood	500-Year Flood
EI	464+25		5202.4	5204.5 480	5206.0 920	5206.6 1170	5207.7 1690
EJ	465+55	County Road	5207.1	5209.3 480	5209.9 920	5210.2 1170	5210.7 1690

1/ Flood elevations pertain to the primary channel and usually remain constant in a lateral direction across the flood plain. However, flood elevations in the outer portions of a cross section may differ from the primary channel due to road crossings, upstream diversions, etc.

TABLE 1

FLOOD FREQUENCY-ELEVATION AND DISCHARGE DATA 1/

Cross Section Designation	Stationing From Lower Study Limit (feet)	Identification	Stream Bed Elevation (ft.) N.G.V.D.	Crest-Elevation Feet National Geodetic Vertical Datum, and Peak Discharge c.f.s. 10-Year Flood	50-Year Flood	100-Year Flood	500-Year Flood
EJ	465+55	Begin Reach 6	5207.1	5209.3 470	5209.9 850	5210.2 1080	5210.7 1530
FA	473+85		5209.7	5213.6 470	5214.6 850	5215.0 1080	5215.8 1530
FB	479+85		5212.7	5215.7 470	5216.5 850	5217.0 1080	5217.7 1530
FC	487+85		5218.4	5222.2 470	5223.4 850	5223.9 1080	5224.8 1530
FD	496+65	Upper Study Limit	5219.1	5224.0 470	5225.4 850	52226.1 1080	5227.5 1530

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TABLE 1 FLOOD FREQUENCY-ELEVATION AND DISCHARGE DATA 1/

Cross Section Desig- nation	Stationing From Lower Study Limit (feet)	Identification	Stream Bed Elevation (ft.) N.G.V.D.	Crest-Elevation Feet National Geodetic Vertical Datum, and Peak Discharge c.f.s.			
				10-Year Flood	50-Year Flood	100-Year Flood	500-Year Flood
BL	346+35	Begin Reach 7 Coal Creek	5149.0	5152.9 230	5153.6 600	5153.9 830	5154.4 1300
GA	352+25		5155.3	5156.0 230	5156.3 600	5156.5 830	5156.8 1300
GB	356+75		5156.0	5158.2 230	5158.7 600	5158.9 830	5159.3 1300
GC	360+95		5159.3	5159.9 230	5160.3 600	5160.5 830	5160.8 1300
GD	366+55		5165.2	5165.9 230	5166.2 600	5166.3 830	5166.3 1300
GE	372+75		5167.9	5168.4 230	5168.7 600	5168.8 830	5169.2 1300
GF	379+15		5172.1	5172.7 230	5172.8 600	5172.9 830	5173.0 1300
GG	385-25		5175.7	5176.4 230	5176.8 600	5176.9 830	5177.2 1200
GH	391+45	County Road	5181.5	5181.9 230	5182.1 600	5182.1 830	5182.3 1300

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				10-Year Flood	50-Year Flood	100-Year Flood	500-Year Flood
GH	391+45	Begin Reach 8	5181.5	5181.9 230	5182.1 600	5182.1 830	5182.3 1300
HA	398+15		5180.5	5183.4 230	5184.3 600	5184.6 830	5185.0 1300
HB	406+15		5181.8	5184.3 230	5185.6 600	5186.0 830	5186.6 1300
HC	409+15		5182.6	5185.2 230	5186.4 600	5186.8 830	5187.6 1300
HD	413+95	Roosevelt Ave.	5189.0	5189.9 230	5190.3 600	5190.5 830	5190.8 1300
HE	417+85		5189.2	5191.3 230	5192.1 600	5192.4 830	5192.9 1300
HF	423+45	Cleveland Ave.	5199.0	5199.5 230	5199.7 600	5199.8 830	5199.9 1300
HG	427+05		5199.6	5201.1 230	5201.6 600	5201.8 830	5202.2 1300

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Cross Section Desig- nation	Stationing From Lower Study Limit (feet)	Identification	Stream Bed Elevation (ft.) N.G.V.D.	Crest-Elevation Feet National Geodetic Vertical Datum, and Peak Discharge c.f.s.			
				10-Year Flood	50-Year Flood	100-Year Flood	500-Year Flood
HH	430+45		5201.7	5202.3 230	5202.9 600	5203.1 830	5203.3 1300
HI	433+85		5206.0	5206.3 230	5206.4 600	5206.4 830	5206.4 1300
HJ	437+25	Grant Ave.	5208.1	5208.7 230	5208.8 600	5208.9 830	5209.2 1300
HK	440+85		5208.8	5209.8 230	5210.2 600	5210.3 830	5210.6 1300
HL	447+65		5213.5	5214.0 230	5214.2 600	5214.3 830	5214.8 1300
HM	450+90		5215.5	5216.2 230	5216.5 600	5216.6 830	5216.8 1300
HN	451±20	County Road	5218.1	5218.6 230	5218.7 600	5218.8 830	5218.9 1300

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				10-Year Flood	50-Year Flood	100-Year Flood	500-Year Flood
HN	451+20	Begin Reach 9	5218.1	5218.6 430	5218.7 800	5218.8 1030	5218.9 1500
IA	452+25		5219.0	5219.7 430	5219.9 800	5220.0 1030	5220.1 1500
IB	457+55		5219.8	5220.5 430	5220.7 800	5220.8 1030	5221.0 1500
IC	462+75		5221.4	5221.8 430	5221.9 800	5222.0 1030	5222.2 1500
ID	470+25		5225.0	5225.9 430	5226.1 800	5226.3 1030	5226.4 1500
IE	478+55	Upper Study Limit	5229.0	5229.5 430	5229.7 800	5229.8 1030	5230.0 1500

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SOIL CONSERVATION SERVICE